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10SEP02 E746881-1 D02917
P01/7700 0.00-0220882.5

Request for grant of a patent

The Patent Office
Cardiff Road
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South Wales NP10 8QQ

1. Your reference
5420502/KB

2. Patent Application Number
0220882.5

3. Full name, address and postcode of each applicant *(underline all surnames)*
- 9 SEP 2002

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Patents ADP number *(if known)*

If the applicant is a corporate body, give the country/state of its incorporation
Country: ENGLAND
State:

4. Title of the invention
DATA PROCESSING SYSTEM

5. Name of agent
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Patents ADP number
1826001

6. Priority details

Country	Priority application number	Date of filing
GB	**0209021.5**	**19 APRIL 2002**

Patents Form 1/77

7. If this application is divided or otherwise derived from an earlier UK application give details

Number of earlier application | Date of filing

8. Is a statement of inventorship and or right to grant of a patent required in support of this request?

YES

9. Enter the number of sheets for any of the following items you are filing with this form.

Continuation sheets of this form	
Description	95
Claim(s)	25
Abstract	2
Drawing(s)	11 + 11

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent *(Patents form 7/77)* 1+2 COPIES

Request for preliminary examination and search *(Patents Form 9/77)*

Request for Substantive Examination *(Patents Form 10/77)*

Any other documents *(please specify)*

11. I/We request the grant of a patent on the basis of this application

Signature _____ Date 9 September 2002

BERESFORD & Co

12. Name and daytime telephone number of person to contact in the United Kingdom

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DATA PROCESSING SYSTEM

The present invention concerns an electronic data processing system for the management of loans.

A typical example of a loan that has to be managed is a Repayment Mortgage in which a loan is secured against property assets and repayments by the borrower typically comprise both interest due and an element of repayment of capital.

Administering and managing Repayment Mortgages has become more complex with the advent of Offset Repayment Mortgages. An Offset Repayment Mortgage is a Repayment Mortgage where although borrower payments in excess of interest due still comprise an element of repaid capital some of these repaid capital amounts can be elected to be presented differently, thus requiring them to be held and treated differently by the electronic processing system used in the management of loans.

Under an Offset Repayment Mortgage, payments by the borrower are either allocated as interest, capital, effectively reducing the loan's capital balance upon which interest is charged, or to a savings account.

There may be more than one savings account and these typically might be called Holiday Account or School Fees Account etc. In economic reality all payments under any type of Repayment Mortgage that are not interest reduce the capital balance upon which loan interest accrues and thus the amounts allocated to the savings account do not accrue interest but instead are offset against the loan's capital balance on which interest is charged. However payments allocated to the or each saving account under an Offset Repayment Mortgage could alternatively be presented as not reducing the capital balance upon which interest accrues but instead are increased over time by the mortgage rate of interest and this accumulated value is offset against the capital balance when determining the amount needed to redeem the mortgage.

Currently available computer systems for the management of loans are relatively inflexible as a result of which the range of different loan types which can be administered, and therefore offered to the public, is severely restricted.

An object of the invention, at least in the preferred embodiment, is to provide a computer system for the management of loans having a novel database structure

which provides added flexibility permitting administration of a wider range of different loan arrangements than is possible with currently available systems.

Another object of the invention, at least in the preferred embodiment, is to provide a computer system for the management of loans having a novel user interface structure permitting a range of different loan arrangements to be set up with ease by relatively unskilled operators.

In the preferred embodiment of the invention, the database structure includes one or more fields for storing, in relation to one or more loans, one or more variable index values which may be used for adjustment of the value of an asset or assets which may be offset against the amount of the loan. The preferred embodiment may accordingly make it possible to set up, in addition to simple repayment and offset mortgages, more complex mortgage arrangements. As an example of such a more complex loan arrangement, the computer system may be arranged to cause the value of an asset which is offset against a loan to be varied so as to track an external index, such as the FT-SE 100 index or the value of shares

in a selected company or a particular interest rate. This tracking may be achieved in the preferred embodiment by changing the value of the stored variable index value at intervals, for example daily, so that the stored value varies in accordance with changes in the external index, and causing the computer system to perform processing operations which vary the stored value of the asset on the basis of the varying stored variable index value.

The changing of the value of the variable index may, in an embodiment, be carried out manually. Preferably, however, a module is provided in the computer system for effecting this adjustment automatically by reference to external data such as the FT-SE 100 index or the value of the relevant shares or a particular interest rate. The external data may, for example, be accessed via the internet.

The preferred embodiment also includes a user interface for permitting the operator to set parameter values which determine the apportionment of repayments as between interest due, capital and the asset or assets to be offset against the loan.

The above combination of features of the preferred embodiment provides substantially improved flexibility compared to prior systems. This is so particularly where the database structure includes a plurality of fields as referred to above for storing a plurality of respective different index values, permitting the system to provide simultaneously a wide range of different loan arrangements. For example, causing different stored variable index values to track different external indices enables the offset asset values of different mortgages managed by the system to track respective different external indices and/or enables a single mortgage managed by the system to be offset against the sum of a plurality of different assets each tracking a different external index. Loan arrangements in which the amount owing is offset against an asset or assets tracking an external index will be referred to herein as "Index Loans".

A review module is preferably included for determining, at intervals, the net position, and this module is preferably operable to output a warning message in the event that a predetermined net position arises.

In order that the present invention may be more readily understood an embodiment thereof will now be described by way of example and with reference to the accompanying drawings, in which:

Figure 1 is a block diagram of an overall view of a data processing system in accordance with the present invention;

Figure 2 is a block diagram of a server according to an embodiment of the present invention;

Figure 3 is a block diagram of a terminal forming part of the data processing system shown in Figure 1;

Figures 4A, 4B and 4C show examples of screens which in the present embodiment are displayed on a user interface at a terminal;

Figure 5 is a flow diagram of processing carried out in the system of Figure 1; and

Figure 6 are block diagrams illustrating database structures involved in the data processing system shown in Figures 1 and 2.

The embodiment to be described is capable of managing a range of repayment loans including standard repayment mortgages, and more sophisticated variants of standard repayment mortgages.

The operation of standard repayment loans is well known. Thus an initial capital sum advanced to the borrower is repaid over a period of years by regular payments which are used firstly to meet interest charges and secondly to make reductions in the initial capital sum. A relatively unskilled clerical worker can process the requirements of such loans with ease.

Thus the main transactions under a standard repayment mortgage can be set out as follows:-

Firstly, the lender makes a mortgage loan to a borrower. This is the initial Capital Balance Outstanding and also the initial Redemption Amount. The Capital Balance Outstanding is the amount of the loan at any time upon which interest accrues. The Redemption Amount is the sum necessary to be paid by the Borrower to the Lender at any time to discharge all and any remaining liability under the mortgage excluding any Redemption Penalties or Outstanding Interest.

Secondly the borrower at regular intervals pays interest based upon the Capital Balance Outstanding and the period since it was last paid. Borrower payments made in excess of the interest due are called Capital Payments and are used to repay part of the loan so that both the Capital Balance Outstanding and the Redemption Amount are reduced at each payment. Clearly the Capital Balance Outstanding and Redemption Amount are always identical. The above steps are repeated over the duration of the loan until the Redemption Amount is reduced to zero.

It will be appreciated that the lender may make further advances to the borrower before the Redemption Amount is reduced to zero so that the Capital Balance Outstanding and the Redemption Amount will be increased by the amount of the further advance.

Although standard repayment mortgages are normally paid on a regular monthly basis it is of course possible for the borrower to make interest/capital payments on a regular and/or ad hoc basis. Finally the amount due from the borrower to the lender upon early redemption, in the absence of any other penalty charges is the Redemption Amount plus any outstanding interest due but not paid.

However it must be appreciated that any of the above procedures are relatively simple as any system dealing with such a mortgage is only concerned with the liability situation.

As already described a more complex variant of the standard repayment loan or mortgage has recently been introduced, this being the Offset Repayment Mortgage.

The following is a simple example of an Offset Repayment Mortgage as compared to a standard repayment mortgage.

Consider a new £100,000 loan with interest due monthly in arrears at the rate of, say, 1% for the month.

Standard Repayment Mortgage

After the first month the accrued interest due is £1,000 and assume the borrower makes a payment of £1,500. Under a Repayment Mortgage the capital balance would be reduced to £99,500 (although exactly when this affects the accrual of interest due does vary from lender to lender). At this point, ignoring any redemption penalties, the amount needed to redeem the mortgage is clearly £99,500.

Assume the next month's interest due is £995 and the borrower again pays £1,500. At this point, ignoring any redemption penalties, the amount needed to redeem the mortgage is clearly £98,995.

Offset Repayment Mortgage

Assume the borrower wishes £150 of the monthly payments to be allocated to a Holiday Savings Account and £100 to a New Car Savings Account. At the end of the first month accrued interest is still £1,000 and so £250 is allocated to reduce the capital balance after the savings account contributions have been made. At this point, ignoring any redemption penalties, the amount needed to redeem the mortgage is £99,500 as this is £99,750 less £150 less £100 in the two 'savings' accounts.

The next month's interest due would be calculated as £997.5 but the two savings accounts would have interest at 1% added to them (£1.5 and £1 respectively). When the borrower now makes the second payment of £1,500 it is allocated as £997.50 interest, £250 in total to the savings accounts and the remaining £252.50 to reduce the capital balance. Thus the capital balance is now £99,497.5 and the savings accounts are worth £301.5 and £201. At this point, ignoring any redemption penalties,

the amount needed to redeem the mortgage is £98,995 as this is £99,497.5 less £301.5 less £201.

When any payments allocated to the or each savings account are increased at exactly the mortgage interest rate it can be seen that an Offset Repayment Mortgage is economically identical to a normal Repayment Mortgage.

It will be appreciated that under the alternative method of presenting an Offset Repayment Mortgage the amounts in the two savings accounts are offset against the capital balance when determining the amount of mortgage interest due and the savings account do not increase or change in value. The overall result is, of course, economically identical at all times.

However this type of mortgage is more difficult to manage than the standard repayment scheme if the client (or the lender) wants a rapid update of the loan situation. The added complexity is brought about by the presentation of the Redemption Amounts as Liabilities less Assets.

However, there is no logical reason why the value of such savings accounts has to be linked to the mortgage's interest rate. Alternatively they can be linked to any

index of prices (Price Index). In addition, each separate savings account could also be linked to more than one Price Index and each savings account might be linked to different Price Indices - although this would clearly break the economic equality referred to above unless it so happened that the Price Index links are all always exactly increased by the mortgage interest rate.

As already noted, for ease of reference a loan whose repayments can be allocated between interest, capital and savings accounts as described above but with the flexibility that each savings account can be linked to one or more Price Indices is termed an Index Loan herein, with the capital balance referred to above called Liabilities and the value of the savings accounts called Assets.

Index Loans thus have a similar basis to the Offset Repayment Mortgages just discussed but have the additional complication that the repayment of the Index Loan is selectively linked to one or more Price Indices so that the Capital Balance Outstanding remains the same until either redemption occurs or further advances are made or repayments of capital are made. There is thus an increasing exposure to at least one Price Index

generated by the positive payments made by the borrower. However, whilst with a standard repayment loan it is easy to predict funding requirements even given variable interest rates, as these are always known in advance, this is not possible with an Index Loan for reasons which will become apparent.

Thus one aspect of the present invention concerns an electronic data processing system capable of managing not only a standard Repayment Mortgage but also of managing Offset Repayment Mortgages and Index Loans and the problems associated with dealing with a wide number of mortgage variants and if it is wished to track and manage the Net Position (either the value of Assets less Liabilities or Liabilities less Assets).

The daily or even more frequency management of such Net Positions could prove to be both onerous and difficult, particularly for relatively unskilled administrative staff.

It has long been appreciated that the performance of the stock markets (as one example of a basis for a Price Index) has historically been better than interest based assets such as deposits or bonds. Thus meeting a

Liability by utilising repayments partly or wholly linked to a Price Index based on share prices is likely to give long term benefits to borrowers. However, creating exposure to such a Price Index, or multiple Price Indices, on a regular basis, as required for Index Loans, would raise a complex set of problems in a market such as the mortgage market where the Net Position has always to be taken into account. For example in the mortgage market lenders issue in the UK some 1.5 million mortgages a year with a total value of approximately £145,000,000,000. Thus the handling on such a scale of Net Liabilities linked to Price Index movements which are potentially volatile can cause major problems to administrators and managing one's Net Position would also be beyond the capability of all but the most financially sophisticated borrowers. In particular it is important not only that clerical staff have available to them a simple way of entering the parameters which control the very wide range of loan types but that the clerical staff administrating such Index Loans can readily compare the necessary balance between Liabilities and Assets and also make alterations to the investment profiles such as changes of Price Index.

As already stated with repayment loans of which a mortgage is only one example, it is simple to calculate future requirements as interest rates are known in advance so that if there is an interest rate change it is simple to make the necessary adjustments either to the term of the loan or to the necessary increased repayments required to meet increased interest changes or reduced payments to meet interest rate reductions.

However, Price Index volatility is such that in order to set the terms of a new Index Loan it is necessary for assumptions to be made with regard to future Price Index movements for the Price Index links of Price Index exposure created by future payments made in respect of the Index Loan in order to try to ensure that the Liabilities are likely to be met at the end of the proposed term of the loan. It will be appreciated that as forecasting of such Price Index movements is by no means an accurate science it is also important to be able to respond appropriately to the history of the movements of the Price Index used during any period of the Index loan if the Price Index changes have been either favourable or unfavourable. Once again it has to be emphasised that it is not possible for a normal worker to be able to respond in such a manner without a new

dedicated computer system.

As will become apparent the effect of the linkage with the or each Price Index can be considered as either affecting the interest payable or the Redemption Amount or a combination of both. The resulting overall effect will be the same, but because of the additional choice factor the management of the Net Liability situation remains very complex. In particular, the effect of the linkage of regular payments to at least one Price Index means that due to the volatility involved it is very difficult for both the lender and the borrower to calculate at any one instant not just the current Net Liability situation but also to try and estimate the progress of the Net Liability in the future. The present invention is also concerned with providing a solution to this problem.

Referring now to Figure 1 of the accompanying drawings this shows an electronic management system in accordance with the present invention comprising a main server 1. The main server 1 is connected by links 11 to client terminals 10_1, ... 10_n via a network N which can be the PSTN. Naturally a range of known types of local networks can be used. The main server 1 also has local input

terminals 10 through which requisite data can be entered for storage in the databases to be described.

Referring now to Figure 2 of the accompanying drawings this shows the main structure elements of the main server 1 shown in Figure 1. The server 1 comprises a processor 12, a main memory 13 and a random access memory 14. The main memory 13 containing a program defining a database structure having storage areas DB1 to DB20 for storing an equivalent number of database files which will be described in greater detail hereinafter. Also provided in the program are modules for performing a plurality of processing routines R1 to R12. The main memory may comprise conventional mass storage means such as hard discs. The server 1 also includes a display 15 which is optional as the important displays will be those seen by users of the system at, for example, terminals 10_1 ... 10_n. These displays are carried out via the user interface routine R12. The server includes input devices 16 which can comprise one or more keypads, interfaces for receiving inputs from one or more other networks and a reader such as a CDRom disc drive for receiving data from an appropriate storage medium. Finally the server includes the appropriate interface circuit 17 by means of which it can communicate with the Network N.

Turning now to the terminal 10 shown in Figure 3 this has a network interface 18 for enabling communication with the network N, a central processing unit 19, a display 20, at least one input device in the form of a key pad 21 and main and secondary memories 22 and 23. The main memory 22 includes storage areas for storing a plurality of standard routines used by a clerical worker to call up appropriate data from the main server so that a user can display a plurality of user interface screens, certain of which will be described hereinafter, for entering and displaying data so that the situation of any borrower can be displayed. Naturally the terminal can be linked to a printer or other hard copy device.

The system shown in Figures 1 and 2 is particularly suited to the management of not only standard repayment mortgages but the other types of mortgage already discussed.

There will now be given a more detailed description of the databases DB1 to DB20. As the present embodiment is for the management of a range of loans and mortgages not all of these databases are essential. As will be apparent from the following description many of the database files are for user input and are not system

specific. The organisation of some of the more important databases are illustrated in Figure 6 of the accompanying drawings.

Thus database DB1 comprises storage areas for storing a Personal Detail file in response to user input. Thus this database stores the necessary personal details of each borrower whose Net Liability position is being managed. The data stored in this database is input by the user via one of the input devices 21. The second database DB2 is optional and comprises storage areas for storing a Third Party Detail file which includes relevant third party details such as those relating to estate agents or solicitors associated with the Liability. Again this data is input by the user. Database DB3 is a storage area which stores a Product file holding data which represents rules which govern each loan as these of course can be varied, again at the user's choice. Thus a particular set of rules will define a product as defined by a user. However the most important product rules can be summarised as follows:

1) Interest calculation method.

2) Redemption penalties.

3) Terms of any special interest rate details.

These product rules are of course applicable to all the types of mortgages which have been discussed.

Database DB4 is again a storage area for storing an Interest Rate file input by a user and representing the interest rates payable on each loan, the dates over which the interest rates were payable on each loan and the date from which the interest rates were applicable. Once again this data is user specific and applicable to all loans and mortgages.

Database DB5 is shown in Figure 6 and is a storage area for storing a Payment Allocation file which holds data relating to the allocation of a payment made by a borrower between Capital, Interest and to one or more Price Indices if the mortgage or loan being managed is an Index Loan. This data is initially user input but is also involved in routine R8 shown in Figure 2 and which will be described hereinafter. Database DB5 acts as a control means which enables a wide range of parameters to be applied to the manner in which detailed processing is carried out for individual loans.

As can be seen from the drawing representing database DB5 this database has six columns 500, 501, 502, 503, 504 and 505 respectively named in this figure "LOANREF", "START DATE", "END DATE", "CATEGORIES", "PRIORITY" and "ALLOCATION". Naturally, the actual database does not have columns named in this manner as the data items will be stored in appropriate address locations but the columns are named in the figure as an aid to understanding.

The Loanref column 500 merely stores data identifying individual Index Loans. The Start Date column 501 holds data identifying the start dates from which subsequent data in the database will determine the manner in which payments for a particular Index Loan will be allocated.

The End Data column 502 is optional and if present holds data defining the end date of the particular set of allocation parameters. The Categories column 503 stores the three main categories between which each payment to a particular Liability, such as Index Loan xxx1, is allocated. These categories are Interest, Capital and Index. Column 504 stores data determining the priority which is given to each of these categories so that when a payment is made the category of highest priority,

namely the Category called, in this example, Interest, will have the payment allocated to it in preference to any category of lower priority. With regard to Loanref xxx1 payment of the interest has the highest priority 1, allocation to a Price Index or Indices has the next highest priority, 2, and repayment of capital has the lowest priority 3. These priorities are purely at the discretion of a user but in this example it has been assumed that a user will naturally wish for all Outstanding Interest to be met before any allocation is made to another category.

Thus the data item in the Allocation column 505 indicates that 100% of the Outstanding Interest is to be paid provided that the amount of the payment is sufficient. It is thus only after this payment has been made that other allocations are carried out. As can be seen the manner in which payments are allocated can be expressed in alternative ways, for example either as a fixed sum or as a percentage. Thus with regard to Loanref xxx1 the data item in Allocation column 505 indicates that if the payment is sufficient £20 is to be allocated to the Price Index or Indices relevant to Loanref xxx1 after the Outstanding Interest has been paid. Once this payment has been allocated then the third data item in column 505

shows that 100% of the unallocated remainder of the payment is to be allocated to the repayment of Capital. Naturally, it is entirely possible that the remainder will be zero.

As can be appreciated the resulting system is extremely flexible and completely under the control of the user via the user interface routine 12. Thus the second Index Loan (Loanref xxx2) has the same priority given to Interest but has two equal priorities (2) to the allocation of the remainder of the payment.

Naturally the system will also include routines to be followed if a payment is insufficient to cover all items of a particular priority. Once again such routines will be at the discretion of the user of the system.

In a variant of the present embodiment also discussed with respect to Figure 4C, database DB5 can also have a category representing penalty interest. Once again the user by means of an appropriate interface can set the priority for payment of penalty interest if any is due. In this case the database may store four priorities 1, 2, 3 and 4.

Database DB6 is also shown in Figure 6 and is a storage area for storing a Price Index Links file which holds details of each Price Index which can be associated with a Liability together with the transaction type and relevant dates. It will be appreciated that for each Liability there will be a number of transactions which can be carried out such as normal payments, ad hoc payments, withdrawals etc. These different transactions are given the generic term transaction types. Once again the initial data is user input. The data stored in database DB6 is used in routine R9 as will be described hereinafter.

Database DB7 is a storage area which stores in response to user input a Price Index Prices file which holds the actual prices of the or each relevant Price Index and the dates at which those prices applied. This data is also user input. The data input can be carried out manually or automatically from external sources such as the Internet or third party data providers.

Database DB8 is a storage area for storing a Review Basis file in response to user input. This file holds the assumptions of Price Index movement under which the initial terms of the loan agreement were set as well as

alterations to these assumptions made during the term of the loan. Thus the data held in this database can comprise:

1) The outstanding term at the end of which the objective is that the Net Liability is less than or equal to zero.

2) The frequency of future Payments that will be exposed to a Price Index.

3) The exposure amount of Payments associated with each Liability to a selected Price Index or Price Indices.

4) The assumption of future Price Index movements.

5) The current Net Liability.

It has to be emphasised that as the system is dealing with volatile Price Indices in order to even start an Index Loan an assumption has to be made as to the possible movements of the or each Price Index to which an Index Loan is linked.

Database DB9 is a storage area for storing a Price Index exposure file which stores in accordance with exposure rules set by a user the dates during which specified amounts are allocated to a Price Index. The basic data is user input and is utilised in routine R9 to be described hereinafter. For all transaction types there will be for each Price Index link in database DB6 the amount or % of the transaction exposed to that particular Price Index. The allocations must sum to 100% for each transaction type. Also stored is the gearing, if any, which is to be applied in exposing a transaction amount to a Price Index and the minimum value. It will be seen that, as shown in database DB6 for Loanref xxx1, transaction type TT1 has links to three Price Indices (PI1, PI3, PI6) so that the allocation, gearing and minimum value data items in respect of these transaction types each have three entries. Once again this arrangement allows great flexibility to a user.

Database DB10 is a storage area for storing a Borrowings Transaction File representing the amounts of borrowings or loans and the dates when such borrowings or loans were made to each borrower. Such borrowing or loan is held under a Liability that has a unique reference code associated with it as is shown for example in databases

DB5, DB6 and DB9.

Database DB11 is for storing data relating to regular payments by the borrower and involves both user input and routine R8.

Database DB12 is a storage area for storing an accrued interest file, the Accrued Interest being the interest which has accrued on each Liability and includes penalty interest (if any) and the relevant dates. This file is used in routine R2 to be described hereinafter.

Database DB13 is a storage area for storing data relating to Paid Interest on each Liability which also includes the amount and date of such Payments and is used in routine R2 to be described hereinafter.

Database DB14 is a storage area for storing transaction details including the transaction amounts, dates and type of transaction in response to user input and also for use in routine 3 and in routine 10 which will be described hereinafter. Data can also be stored in this file from an external source such as a bank into which payments have been made. Thus such payments can be entered via BACS.

Database DB15 is a storage area for storing a Price Index Transactions file comprising data representing each Price Index transaction for each Liability being handled by the system including the unit amount of the transaction, the date of the transaction and the Price Index involved. This data is used in routines R3 and R9. The term "unit amount" will be defined in the description of routine 3.

Database DB16 is a storage area for storing a Corporate Transaction file. The presence of this database is optional as its contents represent, for example, commission payments to third parties and the dates of such payments. This data is user specific and is used in routine R7 to be described hereinafter.

Database DB17 is a storage area for storing a Net Liability file the contents of which represents the Net Liability of each Liability managed by the system. The contents of this file are used in routines 1, 4 and 5 to be described hereinafter.

Databases DB18, DB19 and DB20 are storage areas for storing a respective letter file, standard internal report file and a client statement file. Databases DB18 and DB20 have user input and all three files are used in

routine R11 to be described hereinafter.

It will be appreciated that it is possible to organise the databases just described in other ways by either amalgamation or subdivision.

For example databases 11 and 14 could be amalgamated. Additionally it is only for convenience that database DB17 exists as this value can readily be generated on demand for display from data already present in databases DB1, DB14 and DB15.

As will be described the data processing system of Figures 1 and 2 carries out in response to stored routines seven main process steps in response to data stored in the databases shown in Figure 2:

These processing steps are:

1. Calculating Accrued Interest.

2. Collecting Payments (automated for regular payments and manual for ad hoc payment) and allocating them as various types of transaction and making payments to the borrower.

3. Generating transactions between the lender and various third parties. These would include payments to funding sources, fees to packagers, commission to brokers etc. Under an Index Loan there are, at the lender's discretion, some possible additional payments, for example a commission based upon the value of the Assets.

4. Switching the Price Index links either of current Price Index exposure or that which will be created by future Payments.

5. Carrying out Reviews. This is the process of reviewing how the value of the Net Liability is proceeding against plan and whether any change up or down to the regular payment level is required. This is specific to an Index Loan. The purpose of Reviews is to help ensure that the Price Index exposure gained by expected future Payments is set to the "best" level. In this case best means that according to the assumptions made the currently proposed future Price Index exposure amounts are within the tolerance levels of the required amount that the Review process calculates. A small part of this process is taken up with the interest

element of any regular payments made by the borrower. This occurs with all loans and is a matter of comparing cumulative Interest Paid to cumulative Accrued Interest. The main part of the Review process is thus taken up with determining what the theoretically required Price Index exposure per regular payment is, on the current set of assumptions. A review and possible change of these assumptions is also part of the Review process and to compare the result to the current exposure amount and the acceptable tolerance between the two as set out as part of the Review assumptions. Calculating the theoretical Price Index exposure amount requires the calculation of an accumulation factor which will be defined hereinafter and which requires a future Price Index growth assumption. The Review process may cause this assumption to be revised from time to time. Deducting the current value of Assets from the current Total Borrowings equals the Net Liability and the amount needed currently to redeem the Index Loan (excluding any Outstanding Interest and/or Redemption Penalties). The projected future value of the current value of Assets plus the accumulated value of future proposed Price Index exposure

amounts must between them at least equal the current Liabilities if the Index Loan is to be repaid by the projection date.

6. Maintaining a database of Price Index movements

7. Carrying out redemption checks. When the Net Liability is first less than or equal to zero the system will create a warning flag and possibly automated Index Loans redemption processing.

There will now be given a description of routines R1 to R11 which are invoked to carry out the above main process steps.

Thus routine R1 is used to calculate Total Borrowings and is carried out whenever routines R2, R6, and R8 are to be run and when those items in routine R11 involve or require an up-to-date Total Borrowings number or a User requires such, for example upon a request for this information submitted by a client.

The routine involves summing all transactions for a particular mortgage or loan code that appears in database DB10 (which means they are Borrowing transactions by

definition) and summing all transactions of the Repaid Borrowing type (whether such transactions arose from Ad Hoc Payments or Regular Mortgage Payments) for the same mortgage or loan that appear in database DB14 in order to calculate the Total Borrowings at the calculation date.

The result, and calculation date, is sent to database DB17. This routine is similar to S11 in Figure 5.

Note that Repaid Borrowing transactions in database DB14 are held as opposite sign to the Borrowing transactions in database DB10.

Routine R2 determines the Accrued Interest for a particular Index Loan since the routine was last run. It will be necessary to subdivide this period if the interest accrual rate and/or the Total Borrowings upon which interest accrues changed during the period. The routine will determine such sub-periods using the rules of DB3 and the data in database DB4 and database DB10, collecting the appropriate interest rate(s) from database DB4 and applying them according to the rules of database DB3 to the applicable Total Borrowing collected from database DB17 for the relevant sub-period.

The result for each sub-period, and the sub-period's calculation date is sent to database DB12.

Routine R2 is carried out according to the user defined product rules stored in database DB3 as to when changes to Total Borrowing affects the accrual of interest due from the borrower. Routine R2 is also required whenever routine R3 is to be run and the payment processed by it is to include an element for database DB13. Additionally routine R2 is required when routine R6 is to be run or when a User requires the information.

Routine R3 is carried out either when a User instructs the system that a Payment (Regular Mortgage Payment or Ad Hoc Payment) has been received or that a Positive Advance is to be made or when the system has been scheduled that a Regular Mortgage Payment is due. In this case it is assumed that if such a scheduled due payment does not occur then routine R10 will pick this up and create the necessary opposite payment transaction(s) to neutralise the results of this routine. It is alternatively possible to set the system so that this routine is only activated for scheduled due payments once routine 10 has confirmed their receipt.

The routine involves allocating any Payments made or falling due since the last time it was run between Interest (to become Paid Interest), Capital (Repaid Borrowing) and Index (to contribute to Price Index Value) according to the rules contained in database DB3. For example if Accrued Interest exceeds Paid Interest does any particular type of payment have to have any specific allocation that would override the normal allocation rules of database DB5. The rules in database DB3 may require data from databases DB12 and DB13 to be summed as part of the routine as already noted. Any Index amounts will be converted by the routine into units of specific Price Indices according to the relevant Price Index links that apply from database DB6 and Price Index exposure rules of database DB9, dividing the result by the relevant Price Index price from database DB7 in order to arrive at the Unit Amount.

For Positive Advances the routine will execute the payment according to User input, either to the client by cheque or direct via the banking system and update database DB14 with this information or apply it as a Repaid Borrowing and update database DB15 with this information. This updating will comprise a negative unit transaction for one or more Prices Indices where the sum

of each unit transaction when each is first multiplied by the relevant price of the Price Index equals the payment amount.

The Interest result, and calculation date, are sent to database DB13.

The Interest and Capital results, and calculation date, are sent to database DB14.

The Price Index unit amount results, and calculation date, are sent to database DB15.

Routine R4 is carried out when routines R6 to R8 are to be run. It also may be used in routines R7, R9 and R11 or at the request of the User.

The routine sums all unit transactions in database DB15 separately for each Price Index, multiplies each such sum by the price of the relevant Price Index for the calculation date from database DB7 and sums the results.

The result, and calculation date, is sent to database DB17 with opposite sign to that with which Total Borrowings are sent to database DB17 under routine R1.

Routine R5 is used to calculate Liabilities other than Total Borrowing and is carried out if routine R6 is to be run or according to a User defined schedule or rules.

Database DB17 will already contain Total Borrowings as a result of routine R1 and Price Index Value from routine R4 as at the date this routine is working to. This routine calculates final items that routine R6 will require, namely any Redemption Penalties and any Outstanding Interest.

Redemption Penalties are calculated by the routine based upon the rules in database DB3 and are simply those amounts defined in the product code that apply at any given date to the Borrowings data from database DB17 if Total Borrowings are to be repaid in part or in whole.

Outstanding Interest is calculated as the Accrued Interest less Paid Interest (summed from databases DB12 and 13 respectively to the same date this routine is using and in accordance with the rules in database DB3 if these apply).

The results, and calculation date, is sent to update database DB17.

Routine R6 is carried out according to a User defined schedule or rules, or upon User request.

The routine simply sums the data held in database DB17 for the calculation date in order to determine a current Net Liability amount which is Total Borrowings less Price Index Value plus Outstanding Interest plus Redemption Penalties.

The routine can include a flag, and/or indicator message regarding the relative size of the Net Liability and/or some form of automatic processing rules under which the Price Index Value is utilised to repay Total Borrowings and any Outstanding Interest and Redemption Penalties thus creating a Repaid Borrowing transaction in database DB14 and a Positive Advance transaction in database DB14 and database DB15 (and possibly a Paid Interest transaction in database DB13 and possibly a Redemption Penalty transaction in database DB14).

Routine R7 is carried out according to a User defined schedule or rules, or upon User request and calculates sums for payment to various external parties such as commission to brokers or payments of interest to the funding source(s) of the mortgage or loan and executes

the payment process. For example this can be done on production of a cheque or direct credit via banking systems.

The calculation rules and fee bases will be determined by data held in databases DB2 and DB3 and the sums upon which such fees are applied could include Total or further Borrowings from database DB10, Regular Mortgage and Ad Hoc Payments from database DB14 and Price Index Value from database DB7 and database DB14.

The result, and calculation date, is sent to database DB16.

Routine R8 is carried out according to a User defined schedule or rules, or upon User request and determines, according to various User defined rules and calculation methods from database DB8, what Regular Mortgage Payment will, upon various assumptions such as future average Price Index movement rates, be necessary in order that at some future defined date Net Liabilities will equal a specified amount, allowing for current Total Borrowings and Price Index Value (database DB17) as well as any current Outstanding Interest (databases DB12 and DB13), current Payment Allocation (database DB5), Price Index

Exposure (database DB9) and relevant Product Rules (database DB3).

Future Price Index assumptions may be determined all or in part by calculation of historic interest rates and/or Price Index price movements so that data will need collecting from databases DB4 and DB7 and such historic rates calculated according to User defined rules, and applied to those Price Indices that are relevant (database DB6).

The routine's final result is based upon the determination of whether, upon the basis of this interim result and various User defined tolerances and rules relative to the current Regular Mortgage Payment (database DB11), the Regular Mortgage Payment amount and/or allocation between Interest, Capital and Index needs to change and the effective date of such change. The routine will also involve the triggering of client correspondence regarding these changes if a change to the payment amount and/or allocation is the final result.

The payment amount result, and calculation date, is sent to database DB11, the payment allocation and calculation date is sent to database DB5.

It will be appreciated that in the present embodiment Payments not allocated as Interest can either be used to repay part of the Index Loan so that both the Capital Balance Outstanding and the Redemption Amount are reduced by a known and fixed amount and/or can be elected to be used to reduce the Redemption Amount but not the Capital Balance Outstanding by an amount equal to the payment allocation (Index) multiplied by a Price Index factor as will be described hereinafter. This reduction of the Redemption Amount, if selected, is achieved by reducing the Redemption Amount with an amount equal to Index multiplied by the movement of one or more Price Indices over the period from when the payment was made. Thus if the price movement is a 5% rise the relevant amount will have to be multiplied by 105%. It will be appreciated that the data processing system can also calculate the equivalent interest rate at any time under a standard repayment mortgage that would have produced the same Redemption Amount as generated by an Index Repayment Mortgage.

It will be appreciated that as already described each Index Loan has to have certain basic parameters defined and the choice of these parameters define what is known as the Product type. For any borrower the user will

select the Product type and then input those details specific to that borrower such as personal information, loan amount and planned term. Thus the screen of Figure 4A is directed to setting the product types in order to maximise new business processing efficiency as there is potentially a very wide range of Product types. Thus once a Product type has been set in database 3 a clerical worker need only access the Product type, match the details of an individual borrower and have readily available the relevant figures such as the repayment rate required to meet the potential Liability. Figure 4A shows the screen by means of which Product types are set. Thus window 100, in this embodiment, has seven sections 101 to 107 respectively labelled "Interest Rate", "Payment Target", "Allocation", "Fund Investment", "Commission", "Penalty Interest" and "Redemption Penalty". As shown at present, each of these sections consists of a drop-down menu so that the user can select from a plurality of choices other than those shown in the actual sections.

Each different item in each drop down menu associated with the fields or sections 101 to 107 has associated with it a set of parameters which control the way in which the loan is managed and define the type and loan

arrangement. Thus, different loan "products" may utilise different combinations of items from these drop down menus and/or different values for the associated parameters. Hence, in order to set up a particular loan arrangement, the user chooses a combination of items from the drop down menus of the sections or fields 101 to 107. If, to meet the particular requirements of a particular borrower, it is necessary to adjust the parameters associated with the selected items, this is achieved by navigating, by pointing and clicking operations, from the selected item to a user interface having fields for entering values for the relevant parameters.

Thus, for example, field 102 in Figure 4A is for defining the way in which repayments made by the borrower will be applied as, for example, between capital, interest and an asset whose value is tracked by a stored index. Figure 4C shows the user interface associated with field 102 in the current embodiment and as described elsewhere this user interface is arranged for entering values into database DB5 shown in Figure 6. As can be seen in Figure 4C, different payment target arrangements can be brought into effect at different dates utilising the fields 111 which are so arranged that each time a new date is entered a new set of fields 112 and 113 is displayed for

entry of corresponding parameter values which will then be applied to payments made on and after the new date.

More particularly Routine R12 generates the screen of Figure 4C and it is this screen which enables a user to enter the payment target parameters into database DB5. Thus the window shown at 111 display dates corresponding to column 501 of database DB5. The column marked 112 enables the user to add the selected categories corresponding to column 504 of database DB5 whilst column 113 lists the categories to which a payment can be allocated, namely Interest, Capital, Equity (Index) and in this variant Penalty Interest. Finally the columns enable the user to enter the data corresponding to whether these allocations are expressed as sums or percentages, corresponding to allocation column 505 of database DB5.

The other fields 101 and 103 to 107 shown in Figure 4A similarly have associated with them user interfaces for entering the values of the parameters defined by the items in the drop down menus. Thus, the user interface (not shown) associated with field 101 is for defining interest rates. The user interface associated with field 103 is for defining additional allocations such as

bonuses. The user interface associated with field 104 is for selecting an external index which is to be tracked by a stored index value. The user interfaces associated with fields 105, 106 and 107 are, as shown in the drawing, respectively for defining commission, penalty interest and redemption penalties.

This set of user interfaces constitutes a user interface structure which, together with the corresponding database structures, provides a highly flexible system for loan management in which it is very easy to set up a wide variety of different loan arrangements. There may be a set of standard loan arrangements or products defined by the system and/or bespoke loan arrangements may be created for individual borrowers as needed. Such bespoke arrangements can be created either by taking one of the standard products and modifying its defining parameters as necessary utilising the above described user interface structure or alternatively a new product can be set up by creating new items on the drop down menus shown in Figure 4A and defining values for the sets of parameters associated with those new items.

Turning now to Figure 4B, this shows an example of a screen when a user requires to know the Net Liability

position of a particular borrower.

As can be seen, the screen has a central window 110 called up by the user which displays the Net Liability balance as calculated by the computer system of Figures 1 and 2. Thus the additional Borrowing is accessed from database 10, the Outstanding Interest which has accrued is accessed from the differences between databases DB12 and DB13 and the Assets generated by the exposure of the allocated repayments is shown as "Index Repaid". The Redemption Penalty is of course dependent on the product type, as already described, and is accessed from database 3 so that the final Redemption Amount is displayed on the basis of the above figures. As can be seen, the screen has personal details accessed from database 1 and in the present embodiment, outside the window 110 there is clearly displayed the transactions which have occurred since the initiation of the mortgage or loan.

In order to give a clearer understanding of the operation of the computer system that has just been described there will now be given a worked example of the most basic steps of handling a Liability linked to a Price Index.

The nominal term of the mortgage will be 25 years, the

amount £100,000 which is subject to a variable interest rate of 5.85%. The example given is for the type of an Index Repayment Mortgage in which the monthly payment is the sum of an Index Amount plus the interest cost. As with a standard repayment mortgage, in the present example the quoted interest rate is divided by 12 which is the rate the monthly payments are based on. Thus the first month's interest cost is 0.4875% multiplied by £100,000 = £487.50. Under this type of Index Mortgage no part of the Regular Monthly Payment is used to repay capital and thus the interest cost will not change unless there is a further Borrowing or an ad hoc Repaid Borrowing or there is an interest rate change.

The Index Amount is initially determined by setting an amount which, if accumulated at an assumed Price Index growth rate, will achieve a set target value at a set future date. After this initial determination the Review process, and Review basis, will set the future level of the Index Amount.

As accumulating £80.66 monthly in arrears for twenty-five years at an assumed future Price Index growth rate of 0.80% per month produces a value of £100,000 after twenty-five years this might be used as the Index Amount initially assuming it accords with the Review basis.

Upon the above basis, and for this particular type of Index Mortgage, the monthly payment is £568.16. For a standard repayment mortgage with the same interest rate a sample calculation shows that for a 25 year term with unchanged interest rates a monthly payment of £635.16 is required. However there is no reason why a borrower might not wish to make higher payments and, in order to make direct comparisons with a standard repayment mortgage assume the Index Amount is set instead to £147.66 so that both mortgages have the same monthly payment of £635.16. This is equivalent to assuming future Price Index growth of 0.49% per month rather than the previous level of 0.8%.

Month 1

The borrower payment of £635.16 would be split as follows:

Interest	£487.50
Repayment of principal	£Nil
Index Amount	£147.66

The lender will also set aside the following additional amount to assets in order to match the Index Amount liability:

Assets	£147.66

Month 2

Assuming no changes to the payment bases the borrower payment of £635.16 would again be split as:

Interest	£487.50
Repayment of principal	£Nil
Index Amount	£147.66

The lender will also set aside the following additional amount to assets in order to match the Index Amount liability:

Assets	£147.66

Ignoring any Redemption Penalties or Outstanding Interest the Redemption Amount on a standard repayment mortgage after two months would be:

£100,000 less £147.66 less £148.38 = £99,703.96. Add to this the total payments made of £1,270.32 the total mortgage cost would have been £100,974.28.

Ignoring any Redemption Penalties or Outstanding Interest the Redemption Amount for the Index Mortgage after two months would be £100,000 less the current value of £147.66 paid after month 1 less the value of £147.66 just paid. Clearly the latter Index Amount will have had no Price Index Exposure so the Redemption Amount would be:

£100,000 less £147.66 less £147.66 x Price Index movement.

Add to this the total payments of £1,270.32 the total mortgage cost would have been £101,122.66 less £147.66 x Price Index movement.

If the Price Index movement over the one-month is equal to the mortgage interest rate the Redemption Amount and total mortgage cost would be £99,703.96 and £100,974.28 respectively - in other words exactly the same as the standard repayment mortgage.

If the Price Index movement over the one-month was equal instead to an amount that exceeded the monthly interest rate then the Redemption Amount and total mortgage cost would both be less than under a standard repayment mortgage.

Setting up the System

Using the above example, the system operates in the following manner.

It will be appreciated that a User can set up all databases from scratch each time. In practice though the User will access a product code and this will accord with

a particular Index Mortgage product description and will automatically populate a number of databases. In the present embodiment this is databases DB3,5,6,8,9,16,18,19 and 20.

On this basis the User would be left to populate databases DB1 and 2, for example by hand via a keyboard or electronically by keyboard activation to transfer data from one or more databases on a pre-mortgage completion system.

The current interest rate (0.4875%) is held in database DB4. This database is not specific to any particular Liability and will be updated by some general form of database management and updating. Naturally database DB4 can hold a range of interest rates applicable to different Liabilities and borrowers.

The User will input the initial Borrowing of £100,000 into database DB10.

Ongoing Population of Databases

All databases above may receive additional or change data input by the User. Some form of general database management and updating will update database DB7, as it

is not Liability specific. As can be seen in Figure 6 Database DB7 basically holds details of every Price Index which can be used including the price of each index at every relevant date.

Databases DB11,12,13,14,15 and 17 will be populated with the results of the system routines which will hereinafter be described with relation to the worked example just given.

It will also be appreciated that there are a variety of ways that the system can be set up to start its routine following the start of a new mortgage (or loan). For example all routines might be run on an overnight batch run. Others might be scheduled to run every hour, for example. The assumed first Routine Run/Batch Run date is D/M/Y.

Assume the start date of a mortgage with reference A1 is D/M/Y and that there is immediate activation of a schedule of routines following the User notifying the system that a new mortgage has been successfully set up on the system.

For illustrative purpose the description below goes

through all routines even though in practice the system would be scheduled only to run the definitely required routines. This is because such scheduling would be User defined and subject to wide variation according to various factors.

Routine One

Collect and sum all Borrowing transactions from database DB10 for mortgage reference A1 up to D/M/Y

Result 1: £100,000

Collect and sum all transactions from DB14 of Capital type (a Repaid Borrowing reference) for mortgage reference A1 up to D/M/Y

Result 2: £Nil (the way the data is held this field will be negative)

Calculate result 1 plus result 2

Result 3: £100,000

Send [Total Borrowings, result3] and [D/M/Y] to database DB17 mortgage reference A1 and end routine

Routine Two

Check DB12 for last date of Accrued Interest data for mortgage reference A1. As shown in Figure 6 database DB12 holds the mortgage reference (A1), the date and the amount of Accrued Interest.

Result 1: Null

If result 1 = Null then send [Accrued Interest, Nil] and [D/M/Y] to database DB12 mortgage reference A1 and end routine

Routine Three

Check if any Payment for mortgage reference A1 up to D/M/Y is held in database DB14 and has Payment Due reference. This assumes that due payments are processed with a separate reconciliation routine that allows for due but not paid payments.

Result 1: Null

If result 1 = Null then continue as below

Check if any Positive Advance for mortgage reference A1 up to D/M/Y is held in database DB14 and has Not Processed reference. This is on the assumption that Positive Advances are "registered" on the system by a User and then processed by the system upon the next Batch run. Database DB14 is also shown in Figure 6 and includes the list of mortgage references.

Result 2: Null

If result 2 = Null then end routine

Routine Four

Subroutine 1

Set j = 1

Sum all units from database DB15 for Price Index j up to date D/M/Y for mortgage reference A1

Result 1.j:

Result 1.j.1: Nil/Null

Result 1.j.2: Price Index j

Result 1.j.3: D/M/Y

Collect Price Index price for Price Index in result 1.j.2 as at result 1.j.3 from database DB7

Result 2.j: PIj (D/M/Y)

Check if Price Index is the final Price Index, if not then set j = j+1 and re-run

End subroutine 1

Calculate the sum of {result 1.j.1 multiplied by result 2.j} for all j (this is the Price Index Value)

Result 3: £nil

Send [Price Index Value, result 3] and [D/M/Y] to database DB17 mortgage reference A1 and end routine

Routine Five

Check database DB10 for a Redemption transaction for D/M/Y that has a Not Processed reference for mortgage reference A1

Result 1: Null

If Result 1 = null then Collect Redemption Penalty rules from database DB3 and calculate the Redemption Penalty using D/M/Y

Result 2: £RP

Send [Redemption Penalty, result 2] and [D/M/Y] to database DB17 mortgage reference A1

Collect (up to date D/M/Y) and sum Accrued Interest transactions from database DB12 for mortgage reference A1

Result 3: Null

Collect (up to date D/M/Y) and sum Paid Interest transactions from database DB13 for mortgage reference A1

Result 4: Null

If results 3 and 4 are both Null then send [Outstanding Interest, Nil] and [D/M/Y] to database DB17 mortgage reference A1 and end routine

Routine Six

Calculate Total Borrowings plus Redemption Penalty plus Outstanding Interest less Price Index Value from database DB17 at D/M/Y for mortgage reference A1

Result 1: £100,000 + £RP

Check if result 1 is less than or equal to zero

Result 2: No

If result 2 = No then end routine

Routine Seven

All User defined

Routine Eight

Collect Review Basis for mortgage reference A1. (This, in the present embodiment, includes the target Price Index Value of, currently, £100,000 at D/M/Y+25, interest rate of, currently 0.4875% per month, Price Index growth rate assumption of, currently, 0.49% per month, Net Liability of currently £100,000, Total Borrowings of currently £100,000, Price Index Value of currently £Nil and monthly in arrears payments). In this simplified example there is only one Price Index Gearing which is 100% and the Payment allocation rules are assumed to be to cover interest first then allocate all the remainder to Index.

Calculate the implied Regular Mortgage Payment amount due on D/M+1/Y (and its component parts)

Result 1:

Result 1.1 Total £635.16

Result 1.2 Interest £487.50

Result 1.3 Index Amount £147.66

Compare result 1.1 to the actual current Regular Mortgage Payment so first collect from DB14 for the latest date prior to D/M/Y for an entry for mortgage reference A1

Result 2: Null

If result 2 = Null then do not compare payments and send [Payment Due, result 1] and [D/M+1/Y] to database DB14 mortgage reference A1 and end routine

Routine Nine

Check database DB6 for any Price Index switching for mortgage reference A1 triggered by D/M/Y

Result 1: Null

If result 1 = Null then end routine

Routine Ten

Check database DB14 at D/M/Y for a Payment Allocated for mortgage reference A1

Result 1: Null

If result 1 = Null then end routine

Routine Eleven

All User defined

Assume the next Routine Run/Batch Run date is D/M+1/Y.

Routine One

Collect and sum all Borrowing transactions from database DB10 for mortgage reference A1 up to D/M+1/Y

Result 1: £100,000

Collect and sum all transactions from DB14 of a Capital type (a Repaid Borrowing reference) for mortgage reference A1 up to D/M+1/Y

Result 2: £Nil

Calculate result 1 plus result 2

Result 3: £100,000

Send [Total Borrowings, result 3] and [D/M+1/Y] to database DB17 for mortgage reference A1 and end routine

Routine Two

Check database DB12 for last date of Accrued Interest data for mortgage reference A1

Result 1: D/M/Y

(At this point the simplest approach is to calculate Accrued Interest daily, thus repeating a calculation routine a day at a time until D/M+1/Y, but Users might have a variety of approaches).

If routine Run Date > result 1 then:

Set j = 1

Set Date = result 1 + 1 day

Calculate Total Borrowing from databases DB10 and

DB14 at Set Date less one day (again there are a variety of possible rules here)

Collect Interest rate from database DB4 for (applying to) Set Date

Calculate daily equivalent interest rate R% from Interest rate

Calculate R% x Total Borrowing

Send [Accrued Interest, result 2.j] and [Set Date] to database DB12 mortgage reference A1

Check if Set Date = Routine Run Date (if it is then end routine else add one day to Set Date and add 1 to j and repeat above)

Routine Three

Check if any Payment for mortgage reference A1 up to D/M+1/Y is held in database DB14 and has Payment Due (this note assumes that due payments are processed with a separate reconciliation routine that allows for due but not paid payments).

Result 1: £635.16 with due date D/M+1/Y

As result 1 is not equal to null check if Routine Run date = due date from result 1

If it does not then end routine else

Sum Accrued Interest from database DB12 to D/M+1/Y for mortgage reference A1

Result 2.1: £487.50 (assuming the interest rate and Total Borrowings remained unchanged during the period)

Sum Paid Interest from database DB13 to D/M+1/Y for mortgage reference A1

Result 2.2: £Nil

Calculate result 2.1 less result 2.2

Result 2.3: £487.50

Check if payment amount > = result 2.3

Result 2.4: Yes

If result 2.4 = yes then

Send [Paid Interest, result 2.3] and [D/M+1/Y] to database DB13 mortgage reference A1

Calculate result 1 less result 2.3

Result 3: £147.66

Determine how to allocate result 3 between Capital and Index using the rules from database DB5 (in this case all of result 3 is allocated to Index)

Result 4.1: Capital = £0 (note this is held as a negative number)

Result 4.2: Index = £147.66

For Index transactions collect Price Index links from database DB6

Result 5.1: Price Index One

Collect appropriate Price Index price

from database DB7

Result 5.2: PI1 (D/M+1/Y)

Divide result 4.2 by result 5.2

Result 5.3: Units 1

Send [Unit Transaction, result 5.3] and [Price Index, result 5.1] and [D/M+1/Y] to database DB15 mortgage reference A1

send [Interest, result 2.3] with [D/M+1/Y], send [Capital, result 4.1] with [D/M+1/Y], send [Index, result 4.2] with [D/M+1/Y] and send [Payment Allocated, result 1] with [D/M+1/Y] all to database DB14 under mortgage reference A1

Check if any Positive Advance for mortgage reference A1 up to D/M+1/Y is held in database DB14 and has Not Processed reference (this note assumes that Positive Advances are processed by the User so that they are "registered" on the system but not processed by the system until the next appropriate Batch Run)

Result 3: £Nil

If result 3 = Nil then End Routine

Routine Four

Subroutine 1

Set j = 1

Sum all units from database DB15 for Price Index j up to date D/M+1/Y for mortgage reference A1

Result 1.j:

Result 1.j.1: Units j

Result 1.j.2: Price Index One

Result 1.j.3: D/M+1/Y

Collect Price Index price for Price Index in result 1.j.2 as at result 1.j.3 from database DB7

Result 2.j: PIj (D/M+1/Y)

Check if j is final Price Index, if not then set j = j+1 and re-run

End subroutine 1

Calculate sum of result {1.j.1 multiplied by result 2.j} for all j (this is the Price Index Value)

Result 3: £147.66

Send [Price Index Value, result 3] and [D/M+1/Y] to database DB17 for mortgage reference A1 and end routine

Routine Five

Check database DB10 for a Redemption transaction for D/M+1/Y that has a Not Processed reference for mortgage reference A1

Result 1: Null

If result 1 = null then Collect Redemption Penalty rules from database DB3 and calculate the Redemption Penalty

using D/M+1/Y

Result 2: £RP

Send [Redemption Penalty, result 2] and [D/M+1/Y] to database DB17 for mortgage reference A1

Sum Accrued Interest from database DB12 to D/M+1/Y for mortgage reference A1,

Result 3: £487.50

Sum Paid Interest from database DB13 to D/M+1/Y for mortgage reference A1

Result 4: £487.50

Calculate result 3 less result 4

Result 5: £Nil

Send [Outstanding Interest, result 5] and [D/M+1/Y] to database DB17 for mortgage reference A1

End routine

Routine Six

Calculate Total Borrowings plus Redemption Penalty plus Outstanding Interest less Price Index Value from database DB17 at D/M+1/Y for mortgage reference A1

Result 1: £100,000 + £RP - £147.66

Check if result 1 is less than or equal to zero

Result: No

If result is no then end routine

Routine Seven

All user defined

Routine Eight

Collect Review Basis for mortgage reference A1 (this would include the target Price Index Value of, currently, £100,000 at D/M/Y+25, interest rate of, currently 0.4875% per month, Price Index growth rate assumption of, currently, 0.49% per month, Net Liability of, currently, £100,000 + £RP - PIV (M+1), Total Borrowings of currently £100,000, Price Index Value of currently £147.66 and monthly in arrears payments)

In this simplified example there is only one Price Index, Gearing is 100%, the Payment allocation rules are assumed to be to cover interest first then allocate all the remainder to Index.

Calculate the implied Regular Mortgage Payment amount due on D/M+1/Y (and its component parts)

Result 1:

Result 1.1 Total £635.16

Result 1.2 Interest £487.50

Result 1.3 Index Amount £147.66

Compare result 1.1 to actual current Regular Mortgage Payment so first collect from database DB14 for the latest date prior to D/M+1/Y for an entry for mortgage

reference A1

Result 2: £635.16

Calculate result 2 less result 1.1

Result 3: Nil

Check if result 3 is less than Review basis tolerance

Result 4: Yes

Send [Payment Due, result 2] and [D/M+2/Y] to database DB14 mortgage reference A1 and end routine

Routine Nine

Check database DB6 for any Price Index switching for mortgage reference A1 triggered by D/M+1/Y

Result 1: Null

If Result 1 equals null then end routine

Routine Ten

Check database DB14 at D/M+1/Y for a Payment Allocated for mortgage reference A1

Result 1: £635.16

In practice there will be a complicated set of routines to deal with such things as payments cleared in the bank account but not matched by an expectation of such by the system, cleared payment in bank account is less than the system was expecting, payment cleared early or later than due date etc.

Check Bank Account for Cleared payment = result 1 that has not been checked off

Result 2:

Result 2.1: £635.16

Result 2.2: D/M+1/Y

Check off payment in result 2

Send [Payment Cleared, result 2.1] and [result 2.2] to database DB14 and then end routine

Routine Eleven

All User defined

Having described the basic process steps it is now possible to define the variable factors required to be calculated by the system of Figures 1 and 2 and to define formulae for use in the dedicated computer system which has been described.

Thus the following variables have to be defined:

$_tTB$ = Total (cumulative) Borrowings at time t

Borrowings comprise any sums lent by the lender to the borrower, that are not drawn against the Index Repaid and thus create an interest due and capital repayment liability

upon the borrower, less any repayments of Borrowings made by the borrower to the lender

$_tB$ = A Borrowing, if any, made at time t by the lender

$_tRB$ = A Repaid Borrowing, if any, made at time t by the borrower

$_tTB$ = $\sum_{i=0}^{t} {}_iB - {}_iRB$

$_tINT$ = interest rate % that applies to the mortgage so that it is the rate used in the calculation of interest due between the periods t-1 and t. For definition purposes let this rate be defined as an APR (standardised annual rate).

FP = frequency of Regular Mortgage Payment (so FP = 12 implies monthly, 1 = annual etc). For simplicity it has been assumed that such regular mortgage payments are paid in arrears, at the end of the period, and that all other Ad Hoc Payments, Borrowings and Advances are also only made at such times, as are any interest rate changes. Time t is defined as the time when t of these periods have fully

elapsed.

$_tRMP$ = Regular Mortgage Payment amount due at time t There are a number of ways that $_tRMP$ can be defined, but once values for $_tINT$, N, FP, $_tG$ have been selected then for an N year mortgage with a certain level of borrowings and a certain level of Index Repaid at time t there is a unique solution to the Required Mortgage Payment so that upon such assumptions a target future Redemption Amount is projected to be met upon the target future date. It is possible that there is no N or the lender is expecting the borrower to find all or some of the monies needed to meet the Redemption Amount after N years from another source. In this case another method or arbitrary judgement on the part of the borrower and/or lender is used to determine the Payments that are required, recommended or appropriate and their allocation between Interest, Capital and Index. One possible formulaic definition, in order that the projected Redemption Amount after N years is zero is as follows:

$_tRMP = {}_tI + {}_tRRB + {}_tIA$

$_tI$ = the interest cost element of the Regular Mortgage Payment due at time t

$_tI = \{[(1 + {}_tINT)\hat{}(1/FP)]-1\} \times {}_{t-1}TB$

$_tRRB$ = the Repaid Borrowing element (if any) of the Regular Mortgage Payment due at time t, in this case assumed to be zero throughout

$_tIA$ = the Index Amount, the element of the Regular Mortgage Payment due at time t that is calculated to be necessary to be allocated to the Index Repaid and thus exposed to future (various) Price Index movements assuming no future Repaid Borrowings are made (in practice the lender, having calculated a revised Index Amount, may choose not to actually reflect this in the Regular Mortgage Payment they ask the borrower to make)

$$_{t+1}IA = ({}_tTB - {}_tIR \times [(1 + {}_tG)\hat{}(N \times FP - t)])/S_{(N-t)}$$

If it is wished to assume that future Repaid Borrowings are not zero then in the above formula $_tTB$ is adjusted accordingly.

$_{t}IR$ = Index Repaid amount at time t, the accumulated value of all Index Amounts paid (assuming all due payments have been paid) plus the accumulated value of all Ad Hoc Negative Advances paid less the accumulated value of all Positive Advances taken, all at time t

N = planned mortgage term (in years)

$S_{(N-t)}$ = $\{[(1 + {}_{t}G)\hat{}(N \times FP - t)] - 1\} / {}_{t}G$

$_{t}G$ = Price Index link growth rate % (applying to the period 1/FP) assumed by the lender at time t as applying on average to all the Price Indices that a borrower has selected or may select in the future

PI = a Price Index

PI_J = Price Index J

$_{t}PI_J$ = the level of Price Index J at time t

Advances comprise:

a) Positive Advances which are any sums lent by

the lender to the borrower that the borrower elects to be drawn against (i.e. deducted from) the Index Repaid, less

b) Negative Advances which are any sums paid by the borrower to the lender to increase the Index Repaid amount that were made as all or part of an Ad Hoc Payment (i.e. excluding the effect any Regular Mortgage Payments have on the Index Repaid amount)

${}_tPA$ = a Positive Advance, if any, made by the lender to the borrower at time t

${}_tPA_J$ = the element of a Positive Advance made at time t that is exposed to Price Index J

${}_tAHP$ = Ad Hoc Payment amount paid at time t by the borrower (this is any Payment made by the borrower to the lender that is not a Regular Mortgage Payment)

${}_tAHP$ = ${}_tAHRB + {}_tAHNA$

${}_tAHRB$ = Ad Hoc Repaid Borrowing, the element of the Ad Hoc Payment paid at time t that is allocated

to a Repaid Borrowing by the borrower

$_tAHNA$ = Ad Hoc Negative Advance, the element of the Ad Hoc Payment paid at time t that is allocated to a Negative Advance by the borrower

$_tAHNA_J$ = the element of the Ad Hoc Negative Advance that is exposed to Price Index J

$_tRB = {}_tRRB + {}_tAHRB$

$_tAHNA = {}_tAHNA_1 + {}_tAHNA_2 + \ldots {}_tAHNA_x$ where $_tAHNA_J$ is that part of $_tAHNA$ that is exposed to Price Index J

$_tIA = {}_tIA_1 + {}_tIA_2 + \ldots {}_tIA_x$ where $_tIA_J$ is that part of $_tIA$ that is exposed to Price Index J

$$_tIR = \sum_{i=1}^{t}\sum_{j=1}^{X}\left\{{}_iIA_j \times {}_tPI_j/{}_iPI_j\right\} + \left\{{}_iAHNA_j \times {}_tPI_j/{}_iPI_j\right\} - \left\{{}_iPA_j \times {}_tPI_j/{}_iPI_j\right\}$$

where X = the number of Price Indices

Ignoring any Redemption Penalties or Outstanding Interest, the Redemption Amount at time t = $_tTB - {}_tIR$.

It will be appreciated that this formula includes the

effect of Positive Advances made by the lender to the borrower which are drawn against the Index Repaid. To exclude the effect of these advances the last term of the above equation for $_tIR$ is to be omitted.

It is possible that $_tIA$ may be determined at the discretion of the lender or the borrower and that the Index Repayment Mortgage need not have a planned end date.

It may be required to calculate the equivalent interest rate applying to a Repayment Mortgage that would have produced the same Redemption Amount as under a particular Index Repayment Mortgage.

There are a number of ways that such an equivalent interest rate may be defined by any User of the system, for example as the overall average interest rate. Taking this example, for any Index Repayment Mortgage and a $_tIR$ result at time t, one can calculate the rate of interest, call it $_tINTADJ$, that for a standard repayment mortgage with the same Borrowings, Repaid Borrowings, Negative and Positive Advances, and the same Regular Mortgage Payments as happened under the particular Index Repayment Mortgage, would have produced the same Redemption Amount

(the amount needed to be paid by the borrower in order to redeem the mortgage in full at this time ignoring any Redemption Penalties or Outstanding Interest).

The computer system will calculate ${}_tINTADJ$ according to the bespoke code for that User. The first step would be to determine what ${}_tRA$ (the Redemption Amount at time t under a standard repayment mortgage) would be using the same Borrowings, Repaid Borrowings, Negative and Positive Advances, Regular Mortgage Payments and Interest Rate as for the Index Repayment Mortgage.

$$ {}_tRA = \sum_{i=0}^{t-1} \left\{ \left[{}_iB - {}_iAHRB - {}_iRMP + {}_iPA - {}_iAHNA \right] X \left[\prod_{j=i+1}^{t} \left(1 + {}_jINT\right)^{\Lambda} (1/FP) \right] \right\} $$

If ${}_tRA$, on the assumptions of the previous paragraph, is greater than $({}_tTB - {}_tIR)$ then the Price Index links selected have, overall, reduced the borrower's cost of borrowing. To find the equivalent overall repayment mortgage interest rate the processor can solve the above equation by replacing ${}_jINT$ with INT and solving for INT so that the right hand side equals ${}_tTB - {}_tIR$.

It will accordingly be appreciated that in order to carry out the above functions the computer system of Figure 1

will carry out the following processing steps which are set out in the flow diagram of Figure 5 which represents the main processing normally carried out daily. For illustrative purposes the processes have been defined for an Index Loan at a time t.

Thus Figure 5 of the accompanying drawings is a flow diagram of the main daily operations carried out by the processing system of Figures 1 and 2.

In step S10 a check is made to determine whether or not an initial Borrowing, further Borrowing and/or Repaid Borrowing require processing. Naturally if the initial Borrowing has just been made the other values will be zero.

If the answer to this step is YES database DB10 and DB17 are updated in step S11. Step S12 follows the two previous steps and in this step database DB14 is checked to see if there are any Positive or Negative Advances that require processing. Again if this is the first processing the answer will always be NO but if the answer is YES databases DB14 and DB15 are updated in step S13. In step S14 the values of $_{t-1}TB$, $_{t}TB$, $_{t-1}IP$, $_{t}INT$, $_{t-1}AI$, $_{t-1}IA$, $_{t}AHNA$ and $_{t}PA$ are collected from the appropriate

databases and in step S15 $_{t}AI$ is calculated using the appropriate formulae and added to database DB12. $_{t-1}IP$ is the total interest paid by time t-1 and $_{t-1}AI$ is the total Accrued Interest at time t-1.

Step S16 represents the Payment Collection routine and in it a check is made if a payment has been made since the last processing. If the answer is YES then $_{t}AI - _{t-1}IP$ is deducted and allocated to database DB13 in Step 17 and the excess allocated to the databases DB14 and DB15 in Step S18. Within preset tolerances $_{t}AI$ should equal $_{t}IP$. In step S19 all IA, Price Index prices, $_{t}IP$ and $_{t}AI$ are collected from the appropriate databases so that the system can calculate $_{t}IR$ and current Outstanding Interest in step S20. In step S20 $_{t}IR$ is calculated using the Index Amounts IA, any Positive or Negative Advances which have been made and the Price Index PI prices, and database DB17 updated with this result.

In step S21 the system checks if the first calculated $_{t}IR$ less any Redemption Penalties is equal or greater than $_{t}TB + _{t}AI - _{t}IP$ as held in database DB17 and if the answer is YES step S22 initiates an auto redemption process. If the answer is NO step S23 collects $_{t}G$ as part of the already described Review process and in step S24 the

system calculates average historical ${}_{t}INT$, average historical ${}_{t}G$ and average historical PI price movements using values from the appropriate databases. Step S25 continues the Review process so as to set ${}_{t}G$ and updates database DB8 in step S26.

In step S27 the system calculates S_{N-t} and its value is used in step S28 to calculate an initial value for ${}_{t+1}IA$ and the value so generated is used to check in step S29 if ${}_{t+1}IA = {}_{t}IA$, within defined tolerances. If the answer is NO the Review process is used to set a revised ${}_{t+1}IA$ and databases DB5 and DB8 are updated in step S30. If the answer to step S29 is YES or NO step S31 checks if ${}_{t}IP = {}_{t}AI$. If the answer to this step is NO step S32 initiates a Review process to set a revised ${}_{t+1}I$ which is stored in database DB5 in step S33. Step S34 sets ${}_{t+1}RMP$ using the previously calculated ${}_{t+1}IA$ and ${}_{t+1}I$.

Step S35 checks if any automatic switching of Price Indices is to be carried out. If a switch is required the appropriate databases DB6, DB9 and DB15 are updated for the next cycle.

It will be appreciated that the above described system keeps separate the Capital Balance Outstanding and the

Redemption Amount. However, it is also entirely possible for the system described with minor changes to calculate the requirements of an Index Repayment Mortgage when the Capital Balance Outstanding is reduced by part of each payment made by the borrower. As in the previous embodiment the variables to be calculated will now be defined.

${}_tBT$ = Borrowings Total at time t

Borrowings comprise any sums lent by the lender to the borrower, that are not drawn against the Index Bonus and thus create an interest due and capital repayment liability upon the borrower, less any repayments of Borrowings made by the borrower to the lender from an Ad Hoc Payment

${}_tB$ = A Borrowing, if any, made at time t by the lender

${}_tAHRB$ = A type of Repaid Borrowing. Specifically a Repaid Borrowing made, if at all, by an Ad Hoc Payment at time t by the borrower

$$ {}_tBT = \sum_{i=0}^{t} {}_iB - {}_iAHRB $$

$_tTB$ = Total Borrowings, this is the amount upon which interest accrues

$$_tTB = {}_tBT - {}_tTC$$

$_tTC$ is the cumulative total of all Capital elements of Regular Mortgage Payments made up to and including time t. The Capital element of a Regular Mortgage Payment is a type of Repaid Borrowing.

$_tINT$ = interest rate % that applies to the mortgage so that it is the rate used in the calculation of interest due between the periods t-1 and t. For definition purposes let this rate be defined as an APR (standardised annual rate).

FP = frequency of Regular Mortgage Payment (so FP = 12 implies monthly, 1 = annual etc). For simplicity it has been assumed that all such regular mortgage payments are paid in arrears, at the end of the period, and that all other Ad Hoc Payments, Borrowings and Advances are also only made at such times, as are any interest rate changes. Time t is defined as the time when t of these periods have fully elapsed

${}_tRMP$ = Regular Mortgage Payment amount due at time t

There are a number of ways that ${}_tRMP$ can be defined, but once values for ${}_tINT$, N, FP, and ${}_tG$ have been selected then for an N year mortgage with a certain level of borrowings and a certain level of Index Bonus at time t there is a unique solution to the required Regular Mortgage Payment so that upon such assumptions a target future Redemption Amount is projected to be met upon the target future date.

Assume that the target Redemption Amount is zero after N years

$$ {}_tRMP = \left\{\left[\left(1+{}_tINT\right)\wedge(1/FP)-1\right]\right\} x \left\{{}_{t-1}BT\right\} + {}_tIA $$

Having determined the total amount of the Regular Mortgage Payment at time t, it is subdivided into ${}_tInterest$ and ${}_tCapital$ elements (that are quite different from the two elements upon which it has been calculated) at time t as follows:

$$ {}_tInterest = \left\{\left[\left(1+{}_tINT\right)\wedge(1/FP)\right]-1\right\} x \left\{{}_{t-1}TB\right\} $$

$_{t}Capital = {}_{t}RMP - {}_{t}Interest$

$_{t}IA$ = the Index Amount, the amount that will be exposed to future Price Index movements and used in the calculations of Index Repaid and Index Bonus. Even though it is used to calculate $_{t}RMP$, it is not part of the Regular Mortgage Payment.

$$_{t+1}IA = ({}_{t}BT - {}_{t}IR \times [(1 + {}_{t}G) \wedge (N \times FP - t)]) / S_{(N-t)}$$

$_{t}IR$ = Index Repaid amount at time t, this is used only in the calculation of $_{t+1}IA$ and is the accumulated value of all Index Amounts plus the accumulated value of all Ad Hoc Negative Advances paid less the accumulated value of all Positive Advances taken, all at time t

N = planned mortgage term (in years)

$$S_{(N-t)} = \{ [(1 + {}_{t}G) \wedge (N \times FP - t)] - 1 \} / {}_{t}G$$

$_{t}G$ = Price Index link growth rate % (applying to the period 1/FP) assumed by the lender at time t as applying on average to all the Price Indices that a borrower has selected or may select in the future

PI = a Price Index

PI_J = Price Index J

${}_tPI_J$ = the level of Price Index J at time t

Advances comprise:

a) Positive Advances, which are any sums lent by the lender to the borrower that the borrower elects to be drawn against (i.e. deducted from) the Index Bonus, less

b) Negative Advances, which are any sums paid by the borrower to the lender to increase the Index Bonus amount, that were made as all or part of an Ad Hoc Payment (i.e. excluding the effect any Regular Mortgage Payments have on the Index Bonus amount)

${}_tPA$ = a Positive Advance, if any, made by the lender to the borrower at time t

${}_tPA_J$ = the element of a Positive Advance made at time t that is exposed to Price Index J

$_tAHP$ = Ad Hoc Payment amount paid at time t by the borrower (this is any Payment made by the borrower to the lender that is not a Regular Mortgage Payment)

$_tAHP$ = $_tAHRB + _tNA$

$_tAHRB$ = the element of the Ad Hoc Payment paid at time t that is allocated to a Repaid Borrowing by the borrower

$_tNA$= Negative Advance, the element of the Ad Hoc Payment paid at time t that is allocated to a Negative Advance by the borrower

$_tNA_J$= the element of a Negative Advance that is exposed to Price Index J

$_tNA$= $_tNA_1 + _tNA_2 + \ldots _tNA_X$ where $_tNA_J$ is that part of $_tNA$ that is exposed to Price Index J

$_tIA$ = $_tIA1 + _tIA2 + \ldots + _tIAX$ where $_tIAJ$ is that part of $_tIA$ that is exposed to Price Index J

$$ {}_{t}IR = \sum_{i=1}^{t} \sum_{j=1}^{X} \left\{ {}_{i}IA_{j} \times {}_{t}PI_{j} / {}_{i}PI_{j} \right\} + \left\{ {}_{i}NA_{j} \times {}_{t}PI_{j} / {}_{i}PI_{j} \right\} - \left\{ {}_{i}PA_{j} \times {}_{t}PI_{j} / {}_{i}PI_{j} \right\} $$

where X = the number of Price Indices

Define ${}_{t}MIPI$ as the Mortgage Interest Price Index so that

${}_{t}MIPI = {}_{t-1}MIPI \times [(1 + {}_{t}INT) \wedge (1/FP)]$

with ${}_{0}MIPI = 1$

Ignoring any Redemption Penalties or Outstanding Interest, the Redemption Amount at time t = ${}_{t}TB - {}_{t}IB$

${}_{t}IB$ = Index bonus at time t

$$ {}_{t}IB = \sum_{i=1}^{t} \sum_{j=1}^{X} {}_{i}IA_{j} \times \left\{ {}_{t}PI_{j} / {}_{i}PI_{j} - {}_{t}MIPI_{j} / {}_{i}MIPI_{j} \right\} + \left\{ {}_{i}NA_{j} \times {}_{t}PI_{j} / {}_{i}PI_{j} \right\} - \left\{ {}_{i}PA_{j} \times {}_{t}PI_{j} / {}_{i}PI_{j} \right\} $$

Referring now to Figure 7 of the accompanying drawings this shows a main processor or server at 1 linked by appropriate lines such as a fast LAN to co-servers 2_1, 2_2, 2_3, 2_4, ... 2_n and to processors 3_1, 3_2, 3_3, 3_4, ...3_n. Naturally the provision of co-servers and additional processors will depend on the number of mortgages being administered. Associated with the main processor 1 are printers 4 for generating reports, letters and the like

together with additional back up equipment 5.

External connections are generally indicated at 6 so that the system can communicate via data links 7 and 8 to obtain interest rates and stock market information as well as the banking system to process regular payments such as direct debits. Thus these links are basically utilised for obtaining data relevant to the operation of the system.

The external connection may also include a connection 9 for linking the system to the Internet for the purpose of E-mail, IMAP and Pop3 etc.

Finally the main processor can be connected to the or more lender terminals 10_1, 10_2, 10_3 .....10_n via any suitable network N such as a fast LAN network or the PSTN.

It is of course possible for the fast LAN network to be replaced by the Internet.

However, given the nature of the present invention security reasons mean that it is likely that a non-public network will be preferred for organisations involved in

the management of multiple individual Net Liability positions.

It will be appreciated that there are many software packages which can be used in the implementation of the data processing system which has just been described. In relation to the server 1 the following software can be used, namely SQL Server, Exchange 2000, Win 2000 server, EM Batch Jobs, EM Com + Obj.Proc., EM Com Module, MS ADO Com Obj., MS CDO Com Obj., OLE Automation, VB Run Time and D Com Server.

With regard to the processors 3_1 ... 3_n the following software can be used, namely Win 2000 Pro, EM Batch Jobs, EM Com Module, EM Com+ Obj. Proc., MS ADO Com Obj., OLE Automation and VB Run Time.

Finally with regard to the client terminals 10_1 - 10_n these can utilise Active X Data Objects, OLE Automation, MS Report Designer, EM GUI, EM Com Obj., MS ADO Com Obj. and VB Run Time.

All these software packages are Registered Trade Marks.

GLOSSARY

Accrued Interest

Accrued Interest is the amount of interest that has accrued on an Index Loan since it started and is based upon the Index Loan interest rate and the level of Total Borrowings from time to time.

Assets (Asset)

An Asset or Assets can only be created when a Payment is made by the borrower of an Index Loan to the lender where the borrower requests that such Payment is to create an exposure to the movements in one or more Price Indices (the Payment creates an allocation to Index).

The value of Assets at any time is determined solely by the sum of amounts allocated to Index after each such amount has had applied the relevant movement or movements in value of one or more Price Indices to it after such movement or movements have themselves had the appropriate Gearing factor applied. Where the term Price Index Value is used it refers to the value of Assets.

For the purposes of describing two possible product constructions of an Index Mortgage the terms Index Repaid and Index Bonus are used and, in each case, these are the

value of Assets.

Borrowings

The cumulative total of all capital or principal borrowed by the borrower from the lender to date under any one Index Loan is called Borrowings with each individual tranche of Index Loan borrowed called a Borrowing. Note that this excludes any repayments of capital - see Repaid Borrowings and Total Borrowings.

Gearing

This is the factor that is applied to Price Index movements, or set of factors applied to Price Index movements at specified levels. In the description of two possible product constructions of an Index Mortgage the Price Index levels are assumed to be after the Gearing factor or factors have been applied.

Index

This is the amount that is to be exposed to future movements of one or more Price Indices; such amount is created by the making of a Payment but does not necessarily comprise part of the Payment.

For the purposes of describing two specific Index

Mortgage product constructions the terms Index Amount (in relation to Regular Mortgage Payments) and Negative Advance (in relation to Ad Hoc Payments) are used, in each case these terms refer to Index.

Index Loan

A loan whose repayments made by the borrower to a lender can be linked to one or more Price Indices.

Index Mortgage

A specific type of Index Loan where the loan is secured and specifically secured against specific property, land or building. Index Repayment Mortgage is the same as Index Mortgage.

Index Repaid and Index Bonus

The terms Index Repaid and Index Bonus are both the value of Assets, but in each case relating to a specific product construction of an Index Mortgage and, in particular, a specific construction of both exposure to Price Indices and amount of a Regular Mortgage Payment that is allocated as Index (and hence exposed to future Price Index movements).

Liabilities (Liability)

A Liability or Liabilities can only be created by the existence of an Index Loan and comprise the amount needed at any time in order to repay or redeem the Index Loan (if the effect of Assets is excluded).

The value of Liabilities at any time comprises the current Total Borrowings plus any Outstanding Interest plus any Redemption Penalties.

Net Assets

This is the absolute value of Assets less the absolute value of Liabilities.

Net Liabilities

This is the absolute value of Liabilities less the absolute value of Assets.

Net Position

This is either Net Assets or Net Liabilities.

Outstanding Interest

Outstanding Interest is simply Accrued Interest less Paid Interest.

Paid Interest

Paid Interest is the amount of Payments made by the borrower to the lender that have been allocated towards the payment of interest. It is assumed that Paid Interest can never exceed Accrued Interest.

Payments

These are amounts paid by the borrower to the lender under an Index Loan and can either be made on a regular basis and/or one off. Regular payments under an Index Mortgage are called Regular Mortgage Payments and one off payments made under an Index Mortgage are called Ad Hoc Payments.

Payments must be allocated to a combination of up to three elements: Interest, Capital (this is a Repaid Borrowing) and Index.

Positive Advance

This is a payment from the lender to the borrower but is not a Borrowing, instead the value of Assets is reduced by the amount of the payment. Alternatively the borrower may request that a payment is instead allocated as a Repaid Borrowing, thus reducing Liabilities.

Price Index (and Price Indices)

An index of prices where such prices are the price of a commodity, share or any other type of asset or any index of prices, or derivative on, such assets, or a combination thereof. More than one Price Index is referred to as Price Indices.

Price Index Value

The current value of Assets.

Redemption Penalties

These are the penalties, if any, that may apply upon any Repaid Borrowing from time to time.

Repaid Borrowings

The cumulative total of all capital (or principal) repaid to the lender by the borrower to date under any one Index Loan is called Repaid Borrowings (with each individual repayment called a Repaid Borrowing).

Note that a borrower may request that the value of Assets relating to his Index Loan is reduced by some amount and that this amount be applied as a Repaid Borrowing although this does not affect the Net Position.

Review

This is a process under which the level of Payments being made by the borrower is compared to any Net Position level objective at some future date, the result of which may be to recommend or require a borrower to alter his planned level of future Payments, or adjust intended future Payment dates, or adjust Price Index links applying to the current Assets or adjust the Price Index links intended to apply to future Index allocations, or any combination thereof. Although a Review is not a mandatory requirement of operating an Index Loan it is difficult to see why in practice a lender would not carry them out from time to time.

Review Basis

This is the set of data and assumptions used in order to carry out a Review. Such data and assumptions include a future Net Position target level, a date that such target level applies at, the current value of Assets, the current Total Borrowings, current Outstanding Interest, future Redemption Penalties, future Payment amounts, their frequency and Index allocations, Gearing and future Price Index growth rates.

Total Borrowings

Total Borrowings at any time is the cumulative total of all capital (or principal) borrowed by the borrower from the lender to date under any one Index Loan less the cumulative total of all repayments of capital (or principal). This is Borrowings less Repaid Borrowings. An example of a standard repayment mortgage is given and the term Capital Balance Outstanding is used, this is Total Borrowings.

Note that a borrower may request that the value of Assets relating to his Index Loan is reduced by some amount and that this amount be paid by the lender to the borrower, this does affect the Net Position, but does not affect Borrowings or Total Borrowings.

For the purposes of describing two possible constructions of an Index Mortgage the term Positive Advance is used and this refers to this case where the borrower requests that the value of Assets be reduced and the amount be paid by the lender to the borrower.

CLAIMS:

1. Data-processing apparatus for the management of a plurality of different loans comprising:

means defining a database structure having

a first plurality of fields adapted for storing identification data defining borrowers;

a second plurality of fields adapted for storing financial data defining loan amounts and asset amounts; and

a third plurality of fields adapted for storing parameter values which define loan management operations so as to permit different loans to be managed in accordance with different management operations as defined by different stored said parameter values, at least one of said third plurality of fields being adapted to store a variable index value for use in making adjustments to one or more of said asset amounts;

means defining a plurality of graphical user interfaces

enabling an operator to enter at least some of said parameter values into said third plurality of fields and to associate different said parameter values with different loans; and

processing means operable for performing management functions on said loans in accordance with the parameter values associated with the respective different loans.

2. Data-processing apparatus having stored therein a computer program for managing a plurality of different loans, said program comprising:

means for storing identification data for a plurality of borrowers;

means for storing data defining liabilities relating to loans made to respective said borrowers;

means for storing data defining assets relating to respective said borrowers;

means for storing at least one variable index value for use in adjusting the value of at least some of said assets;

means for recording payments made by respective different borrowers relating to said assets and said liabilities of the respective borrower;

means for the performance of data processing functions relating to said payments, said assets, said index values and said liabilities for respective different said loans;

control means for storing a plurality of parameters which define the operations which take place during the performance of said data processing functions; and

user interface means for enabling a user to enter selected values for said parameters and to associate said selected values with the respective said loans so that the data processing functions performed in relation to different said loans may comprise respective different operations in dependence upon the selected values of said parameters.

3. Apparatus according to claim 2 wherein said parameters define the allocation of an incoming payment between repayment of capital, payment of interest and generating an asset.

4. Apparatus according to claim 2 or claim 3 and adapted to generate an alert when the value of liabilities and the value of assets are substantially equal.

5. A computer system for managing Net Position, Assets and Liabilities, the system comprising:

memory means and digital processor means, wherein said memory unit includes:

a plurality of control programs defining routines to be carried out by the digital processing means;

a liability file having a plurality of storage areas for storing the amounts of a plurality of Liabilities in response to user input;

a liability interest rate file having a plurality of areas for storing in response to user input interest rates applicable to said Liabilities;

an accrued interest file having a plurality of storage areas for storing data relating to the amounts of interest accrued on each of said Liabilities;

a paid interest file having a plurality of storage areas for storing data relating to amounts and dates of any interest paid in respect of individual ones of said Liabilities;

a payment file having a plurality of storage areas for storing data relating to payments made that create exposure to a Price Index so as to generate Assets, each payment being related to one of said Liabilities;

a Price Index file having a plurality of storage areas for storing in response to user input data identifying at least one Price Index;

a Price Index exposure file having a plurality of storage areas for storing user input data defining the degree of exposure of a payment associated with a particular Liability to a selected Price Index or to Selected Price Indices;

a Price Index price file having a plurality of storage areas for storing in response to user input the data relating to the historic prices of the or each one of said Price Indices stored in said Price Index file;

a Price Index transactions file having a plurality of storage areas for storing data relating to the amount of transactions that create or reduce exposure to any Price Index and the date of the transaction, where such transactions are in respect of a particular one of said Liabilities; and

wherein the digital processing means is adapted to calculate the total amount of each Liability from data stored in said liability file;

to calculate accrued interest for each Liability from data stored in said accrued interest file;

to calculate the value of transactions linked to a Price Index and associated with a Liability in response to data stored in said Price Index price file and said Price Index transactions file;

to calculate for each Liability the actual Net Liability from data stored in said liability file, said accrued interest file, said paid interest file, said payment file, said Price Index price file and said Price Index transaction file;

to read in response to an output command entered through said input unit, data generated by said fourth processor means; and

to generate in response to an output command display data representing the Net Position of a selected Liability and its associated Assets.

6. A system according to claim 5, wherein said digital processing means is adapted in response to a control program to calculate from the data in the first database the amount ${}_tIR$ of the Liability deemed to have been repaid at a time t as a result of amounts allocated as Index, and the resulting exposure to one or more Price Indices, from payments made by the borrower in accordance with the formula

$$ {}_tIR = \sum_{i=1}^{t} \sum_{j=1}^{x} \left\{ {}_iIA_j \times {}_tPI_j / {}_iPI_j \right\} + \left\{ {}_iAHNA_j \times {}_tPI_j / {}_iPI_j \right\} $$

where ${}_iIA_j$, = the amount of a payment made at time i which has been linked to a Price Index j;

${}_iAHNA_j$ = the element of an Ad Hoc Negative Advance made at time i that has been exposed to Price Index j;

${}_iPI_j$ = the price of Price Index j at time i;

X = the total number of Price Indices.

7. A system according to any one of claims 5 and 6, wherein said digital processing means is adapted in response to a control program to calculate from the data in the first database the amount ${}_tIR$ of the Liability deemed to have been repaid at a time t as a result of amounts allocated as Index, and the resulting exposure to one or more Price Indices, from payments made by the borrower in accordance with the formula

$$ {}_tIR = \sum_{i=1}^{t} \sum_{j=1}^{x} \left\{ {}_iIA_j \times {}_tPI_j / {}_iPI_j \right\} + \left\{ {}_iAHNA_j \times {}_tPI_j / {}_iPI_j \right\} $$

where ${}_iIA_j$, = the amount of a payment made at time i which has been linked to a Price Index j;
${}_iAHNA_j$ = the element of an Ad Hoc Negative Advance made at time i that has been exposed to Price Index j;
${}_iPI_j$ = the price of Price Index j at time i;

X = the total number of Price Indices.

8. A system according to any one of claims 5 to 7 and comprising a Review Basis file having a plurality of storage areas for storing in response to user input data

representing a numerical value ($_tG$) representing an assumed growth rate of said Price Index associated with one or more particular liabilities; and

wherein said digital processor means is adapted to calculate in response to a control program regular payments ($_tRMP$) due from the borrower of a particular Liability potentially sufficient over a period of the Index Loan to repay the interest due and the capital balance by calculating for selected amounts of selected ones of said regular payments made by a borrower an accumulation factor for the selected amounts derived from said numerical value.

9. A system according to claim 8, wherein said digital processing means is adapted to calculate for any particular Liability from data in said accrued interest file, said paid interest file, said payment file, said Price Index file, said Price Index transaction file and said Review Basis file, a projected future Net Position for said particular Liability on the basis of both the actual variations in the Price Index or Price Indices to which the payment stored in said payment file is linked, and on the basis of the assumption of Price Index behaviour stored in said Review Basis file.

10. A system according to claim 8, wherein said digital processing means is adapted to calculate in response to a control program from data comprising $_{t}$INT, the interest rate that applies to the Index Loan, for period t-1 and t, some period N, the frequency (FP) of regular payments and an Index Amount ($_{t}$IA) which is the portion of the ($_{t}$RMP) to be exposed to the Price Index (PI) and the future growth rate of the Price Index assumed at time t, which growth rate is given by ($_{t}$G). a projected future value of Assets.

11. A system according to one of claims 5 to 10, wherein said digital processing means is adapted in response to a control command to calculate a $_{t}$G potentially different from $_{t-1}$G from the history of prices of the Price Index stored in said Price Index price file and the history of stored interest rates stored in said liability interest file.

12. A system according to any one of claims 8 to 11, and wherein said digital processing means is adapted to calculate in response to a control command at a selected time t during the period N the current value of $_{t+1}$IA and to compare the actual growth rate of the Price Index with the assumed growth rate ($_{t}$G) and to compare $_{t}$IR with the

planned value of the same so as to generate data indicating whether or not a change has to be made to ${}_tG$ for the subsequent period of the Loan, and to recalculate a new value of ${}_{t+1}IA$.

13. A system according to claim 11 or 12, wherein said digital processing means is adapted to calculate at time t in response to a control program the Index Amount ${}_{t+1}IA$ representing the element of ${}_{t+1}RMP$ due at time t+1 to be exposed to the movement of the Price Index (PI) in accordance with the equation

$$ {}_{t+1}IA = \left({}_tTB - {}_tIR \, x \left[\left(1 + {}_tG \right) \wedge \left(N \, x \, FP - t \right) \right] \right) / S_{(N-t)} $$

where ${}_tG$ = Price Index growth rate during one FP period assumed at time t to apply for each such period from t to N for some value of N, and $S_{(N-t)}$ is an accumulation factor.

14. A system according to claim 13, wherein said digital processing means is adapted to calculate the accumulation factor $S_{(N-t)}$ in accordance with the equation

$$ S_{(N-t)} = \left\{ \left[\left(1 + {}_tG \right) \wedge \left(N \, x \, FP - t \right) \right] - 1 \right\} / {}_tG $$

15. A system according to any one of claims 5 to 14, wherein digital processing means is adapted to calculate in response to a control program the interest cost element ($_tI$) of $_t$RMP due at time t in accordance with the equation

$$_{t+1}I = \left\{\left[\left(1 + {}_{t+1}INT\right)^{\wedge}(1/FP)\right] - 1\right\} x\ {}_tTB,$$

where

$$_tTB = \sum_{i=0}^{t-1} {}_iB - {}_iRB$$

$_t$TB = Total Borrowings (cumulative) at time t,

$_t$B = a Borrowing made at time t by the Lender, and

$_t$RB = a Repaid Borrowing made at time t by the Borrower.

16. A system according to any one of claims 5 to 15, wherein said digital processing means is adapted to calculate in response to a control command

$$_tRA = \sum_{i=0}^{t-1} \left\{ \left[{}_iB - {}_iAHRB - {}_iRMP + {}_iPA - {}_iAHNA \right] X \left[\prod_{j=i+1}^{t} \left(1 + {}_jINT\right)^{\Lambda} (1/FP) \right] \right\}$$

where AHRB represents an Ad Hoc Payment allocated to a Repaid Borrowing by the borrower, and

AHNA represents an Ad Hoc Negative Payment allocated to a Negative Advance by the borrower.

17. A system according to any one of claims 5 to 16, wherein said digital processing means is adapted to calculate in response to a control command

$$ {}_{t}RA_{2} = \sum_{i=0}^{t-1} \left\{ \left[{}_{i}B - {}_{i}AHRB - {}_{i}RMP + {}_{i}PA - {}_{i}AHNA \right] X \left[\prod_{j=i+1}^{t} \left(1 + {}_{j}INT_{2} \right)^{\Lambda} (1/FP) \right] \right\} $$

where ${}_{j}INT_{2} = INT_{2}$ for all j, and to solve for the value of INT_{2} that would cause ${}_{t}RA_{2}$ to equal ${}_{t}TB - {}_{t}IR$.

18. A system according to any one of the preceding claims 5 to 17, where said digital processing means is adapted in response to a control command to compare ${}_{t}TB$ plus Outstanding Interest to ${}_{t}IR$ and to generate an alert to cause the Index Loan to be redeemed when ${}_{t}IR$ is greater than or equal to ${}_{t}TB$ plus Outstanding Interest and any applicable redemption penalties.

19. A system according to any one of claims 5 to 18, wherein said accrued interest file is for storing present interest rates applicable to said Liabilities.

20. A system according to claim 19, wherein said accrued interest file is for storing present and past interest rates applicable to said Liabilities.

21. A system according to any one of claims 5 to 20 and comprising an Assets database having a plurality of storage areas for storing data representing the Assets held by a lender for the purpose of matching appropriate Price Index exposure, and where the digital processing means is adapted to sum for all Index Loans the current Index Repaid value for the or each Price Index.

22. A computer system according to any one of claims 5 to 21 including at least one remote terminal having a central processor, a display device, a memory unit and a display unit, and wherein said remote terminal has an interface circuit adapted to interface with the computer system whereby a command entered at the input means of said terminal generates a selective display on said display unit of the Net Position, Assets and Liabilities of a borrower.

23. A method of operating a computer system, the system comprising:

an input unit, a memory unit, a display unit and a digital processing unit to manage the Net Positions, Assets and Liabilities of a plurality of borrowers, comprising the method providing said memory unit with:

a liability file having a plurality of storage areas for storing the amounts of a plurality of Liabilities in response to user input;

a liability interest rate file having a plurality of areas for storing in response to user input present and, if different, past interest rates applicable to said Liabilities;

an accrued interest file having a plurality of storage areas for storing data relating to the amounts of interest accrued on each of said Liabilities;

a paid interest file having a plurality of storage areas for storing data relating to amounts and dates of any interest paid in respect of individual ones of said Liabilities;

a payment file having a plurality of storage areas for storing data relating to payments made that create exposure to a Price Index, each payment being related to one of said Liabilities;

a Price Index file having a plurality of storage areas for storing in response to user input data identifying at least one Price Index;

a Price Index exposure file having a plurality of storage areas for storing user input data defining the degree of exposure of a payment associated with a particular Liability to a selected Price Index or to selected Price Indices;

a Price Index price file having a plurality of storage areas for storing in response to user input the data relating to the historic prices of the or each one of said Price Indices stored in said Price Index file;

a Price Index transactions file having a plurality of storage areas for storing data relating to the amount of transactions that create or reduce exposure to any Price Index where such transactions are in respect of a particular one of said Liabilities, the date of the

transaction; and

comprising utilising said digital processing means to calculate the total amount of each Liability from data stored in said liability file;

to calculate the value of transactions linked to a Price Index and associated with a Liability in response to data stored in said Price Index price file and said Price Index transactions file;

to calculate for each liability data representing the actual Net Liability from data stored in said liability file, said accrued interest file, said paid interest file, said payment file, said Price Index file and said Price Index transaction file;

to read in response to a command entered through said input unit the data representing the Net Liability of the borrower; and

to generate in response to an output command a display of the Net Liability situation of a selected Liability and its associated Assets.

24. A method according to claim 23 and wherein the system comprises a Review Basis file having a plurality of storage areas for storing in response to user input data representing a numerical value ($_tG$) based on the predicted future performance of the or each of said Price Indices, comprising calculating in response to a control program regular payments ($_tRMP$) due from the borrower of a particular Liability potentially sufficient over a period of the Index Loan to repay the interest due and the capital balance by calculating for selected amounts of selected ones of said regular payments made by a borrower an accumulation factor for the selected amounts derived from said stored numerical value ($_tG$) of the or each one of the Price Indices (Pi_j) associated with said particular Liability.

25. A method according to either of claims 23 to 24, comprising calculating from the data in the first database the amount $_tIR$ of the Liability deemed to have been repaid at a time t as a result of amounts allocated as Index, and the resulting exposure to one or more Price Indices, from payments made by the borrower in accordance with the formula

$$ {}_tIR = \sum_{i=1}^{t} \sum_{j=1}^{x} \left\{ {}_iIA_j \times {}_tPI_j / {}_iPI_j \right\} + \left\{ {}_iAHNA_j \times {}_tPI_j / {}_iPI_j \right\} $$

where ${}_iIA_j$, = the amount of a payment made at time i which has been linked to a Price Index j;

${}_iAHNA_j$ = the element of an Ad Hoc Negative Advance made at time i that has been exposed to Price Index j;

${}_iPI_j$ = the price of Price Index j at time i;

X = the total number of Price Indices.

26. A method according to any one of claims 23, 24 or 25, comprising calculating for any particular Liability from data in said accrued interest file, said paid interest file, said payment file, said Price Index file, said Price Index transaction file and said Review Basis file, a projected future Net Position for said particular Liability on the basis of both the actual variations in the Price Index or Price Indices to which the payment stored in said payment file is linked, and on the basis of the assumption of Price Index behaviour stored in said Review Basis file.

27. A method according to claim 26, comprising calculating

$$ {}_{t}IR = \sum_{i=1}^{t}\sum_{j=1}^{x}\left\{{}_{i}IA_{j} \times {}_{t}PI_{j} / {}_{i}PI_{j}\right\} + \left\{{}_{i}AHNA_{j} \times {}_{t}PI_{j} / {}_{i}PI_{j}\right\} - \left\{{}_{i}PA_{j} \times {}_{t}PI_{j} / {}_{i}PI_{j}\right\} $$

where ${}_{i}PA_{j}$ = a positive advance made at time i which is exposed to the Price Index j.

28. A method according to claim 27, comprising calculating in response to a control program from data comprising ${}_{t}INT$, the interest rate that applies to the Index Loan, for period t-1 and t, some period N, the frequency (FP) of regular payments and an Index Amount (${}_{t}IA$) which is the portion of the (${}_{t}RMP$) to be exposed to the Price Index (PI) and the future growth rate of the Price Index assumed at time t, which growth rate is given by $({}_{t}G)_{j}$ a projected future value of Assets.

29. A method according to any one of claims 23 to 28, comprising calculating a ${}_{t}G$ potentially different from ${}_{t-1}G$ from the history of prices of the Price Index stored in said Price Index price file and the history of stored interest rates stored in said liability interest file.

30. A method according to claim 29, comprising calculating in response to a control command at a selected time t during the period N the current value of

$_{t+1}$IA and comparing the actual growth rate of the Price Index with the assumed growth rate ($_t$G) and to comparing $_t$IR with the planned value of the same so as to generate data indicating whether or not a change has to be made to $_t$G for the subsequent period of the Loan, and recalculating a new value of $_{t+1}$IA.

31. A method according to claim 29 or 30, calculating at time t in response to a control program the Index Amount $_{t+1}$IA representing the element of $_{t+1}$RMP due at time t+1 to be exposed to the movement of the Price Index (PI) in accordance with the equation

$$_{t+1}IA = \left(_tTB - _tIR\, x \left[\left(1 + _tG \right) \wedge \left(N\, x\, FP - t \right) \right] \right) / S_{(N-t)}$$

where $_t$G = Price Index growth rate during one FP period assumed at time t to apply for each such period from t to N for some value of N, and $S_{(N-t)}$ is an accumulation factor.

32. A method according to claim 30, comprising calculating the accumulation factor $S_{(N-t)}$ in accordance with the equation

$$S_{(N-t)} = \left\{ \left[\left(1 + _tG \right) \wedge \left(N\, x\, FP - t \right) \right] - 1 \right\} / _tG$$

33. A method according to any one of claims 23 to 32, comprising calculating in response to a control program the interest cost element ($_tI$) of $_tRMP$ due at time t in accordance with the equation

$$_{t+1}I = \left\{\left[\left(1 + {}_{t+1}INT\right)^{\Lambda}(1/FP)\right] - 1\right\} x\ {}_tTB,$$

where

$$_tTB = \sum_{i=0}^{t-1} {}_iB - {}_iRB$$

$_tTB$ = Total Borrowings (cumulative) at time t,

$_tB$ = a Borrowing made at time t by the Lender, and

$_tRB$ = a Repaid Borrowing made at time t by the Borrower.

34. A method according to any one of claims 23 to 33, wherein comprising calculating in response to a control command

$$_tRA = \sum_{i=0}^{t-1} \left\{ \left[{}_iB - {}_iAHRB - {}_iRMP + {}_iPA - {}_iAHNA \right] X \left[\prod_{j=i+1}^{t} \left(1 + {}_jINT\right)^{\Lambda}(1/FP) \right] \right\}$$

where AHRB represents an Ad Hoc Payment allocated to a Repaid Borrowing by the borrower, and

AHNA represents an Ad Hoc Negative Payment allocated to a Negative Advance by the borrower.

35. A method according to any one of claims 23 to 34, wherein said fourth processor means is adapted to calculate in response to a control command

$$ {}_{t}RA_{2} = \sum_{i=0}^{t-1} \left\{ \left[{}_{i}B - {}_{i}AHRB - {}_{i}RMP + {}_{i}PA - {}_{i}AHNA \right] X \left[\prod_{j=i+1}^{t} \left(1 + {}_{j}INT_{2} \right)^{\Lambda} \left(1/FP \right) \right] \right\} $$

where ${}_{j}INT_{2} = INT_{2}$ for all j, and to solve for the value of INT_{2} that would cause ${}_{t}RA_{2}$ to equal ${}_{t}TB - {}_{t}IR$.

36. A method according to any one of claims 23 to 35, where said fourth processor means is adapted in response to a control command to compare ${}_{t}TB$ plus Outstanding Interest to ${}_{t}IR$ and to generate an alert to cause the Index Loan to be redeemed when ${}_{t}IR$ is greater than or equal to ${}_{t}TB$ plus Outstanding Interest and any applicable redemption penalties.

37. A method according to any one of claims 23 to 36 wherein the system comprises an Assets database having a plurality of storage areas for storing data representing the Assets held by a lender for the purpose of matching appropriate Price Index exposure, and including in response to a control command summing for all Index Loans the current Index Repaid value for the or each Price Index.

38. Data-processing apparatus for the management of a plurality of loans comprising:

means defining a database structure having

a first plurality of fields adapted for storing identification data defining borrowers;

a second plurality of fields adapted for storing financial data defining loan amounts and asset amounts; and

a third plurality of fields adapted for storing parameter values which define loan management operations so as to permit different loans to be managed in accordance with different management

operations as defined by different stored said parameter values, at least one of said third plurality of fields being adapted to store a variable index value for use in making adjustments to one or more of said asset amounts;

means for entering different sets of said parameter values into said third plurality of fields, and to associate respective said different sets with respective different loans thereby to provide a plurality of different loan arrangements; and

processing means operable for performing management functions on different loans in accordance with the respective different sets of parameter values.

ABSTRACT

DATA PROCESSING SYSTEM

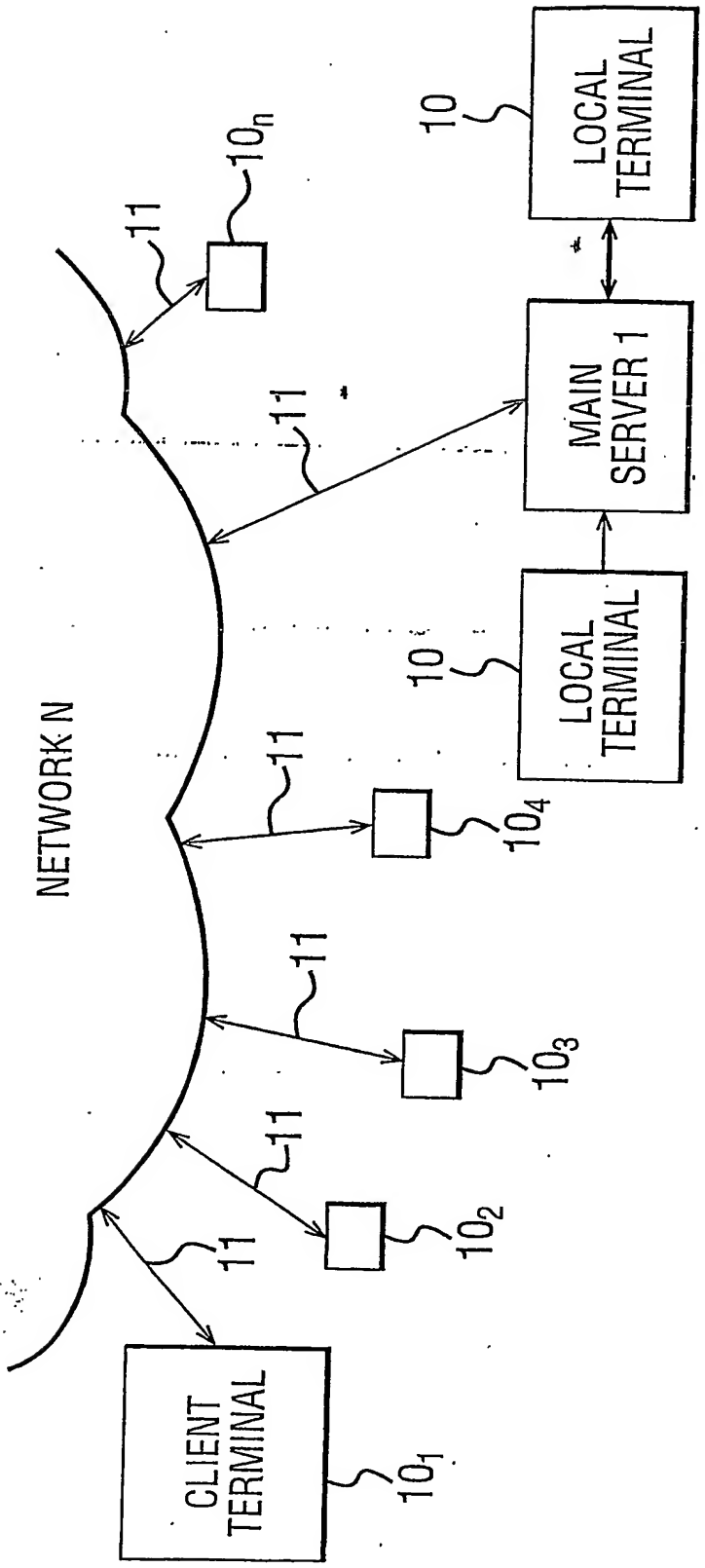
A data-processing system for managing loans has a novel database structure which includes one or more fields for storing, in relation to one or more loans, one or more variable index values which may be used for adjustment of the value of an asset or assets which may be offset against the amount of the loan. This makes it possible to set up, in addition to simple repayment and offset mortgages, more complex mortgage arrangements. For example, the computer system may be arranged to cause the value of an asset which is offset against a loan to be varied so as to track an external index, such as the FT-SE 100 index or the value of shares in a selected company or a particular interest rate. This tracking may be achieved by changing the value of the stored variable index value at intervals, for example daily, so that the stored value varies in accordance with changes in the external index, and causing the computer system to perform processing operations which vary the stored value of the asset on the basis of the varying stored variable index value. Preferably, a module is provided in the computer system for effecting this adjustment automatically by reference to external data such as the

FT-SE 100 index or the value of the relevant shares or a particular interest rate. The external data may, for example, be accessed via the internet.

A novel user interface structure permits the operator to set parameter values which define the loan management operations to be performed, such as the apportionment of repayments as between interest due, capital and the asset or assets to be offset against the loan. The system may thus be easily setup to provide simultaneously a wide range of different loan arrangements. For example, causing different stored variable index values to track different external indices enables the offset asset values of different mortgages managed by the system to track respective different external indices and/or enables a single mortgage managed by the system to be offset against the sum of a plurality of different assets each tracking a different external index.

Figure 1

FIG. 1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CLIENT TERMINAL
10_1
11
10_2
11
10_3
11
10_4
11
10
LOCAL TERMINAL
MAIN SERVER 1
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LOCAL TERMINAL
11
10_n

FIG. 2

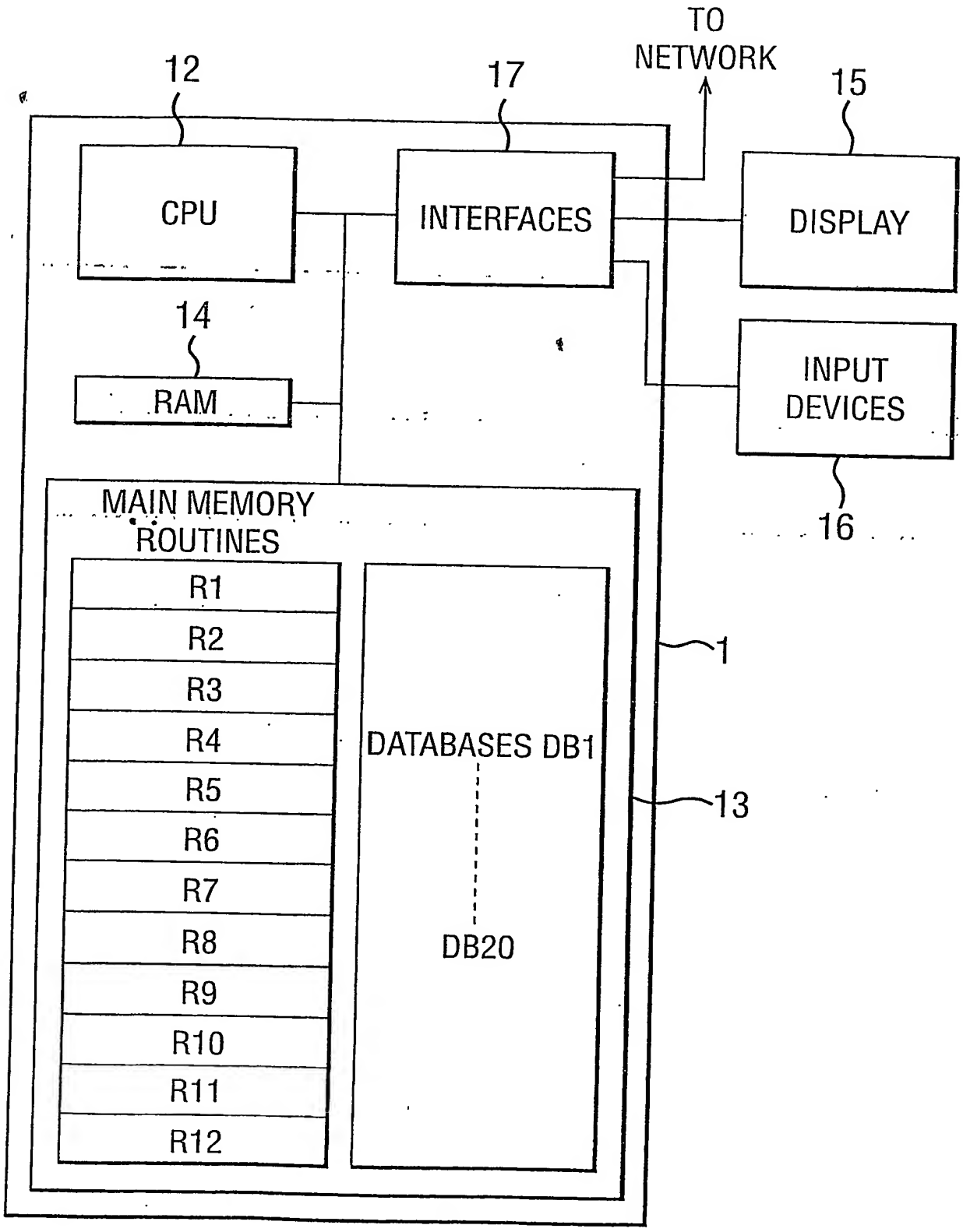

TO NETWORK
12
17
15
CPU
INTERFACES
DISPLAY
14
RAM
INPUT DEVICES
16
MAIN MEMORY ROUTINES
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
DATABASES DB1
DB20
1
13

FIG. 3

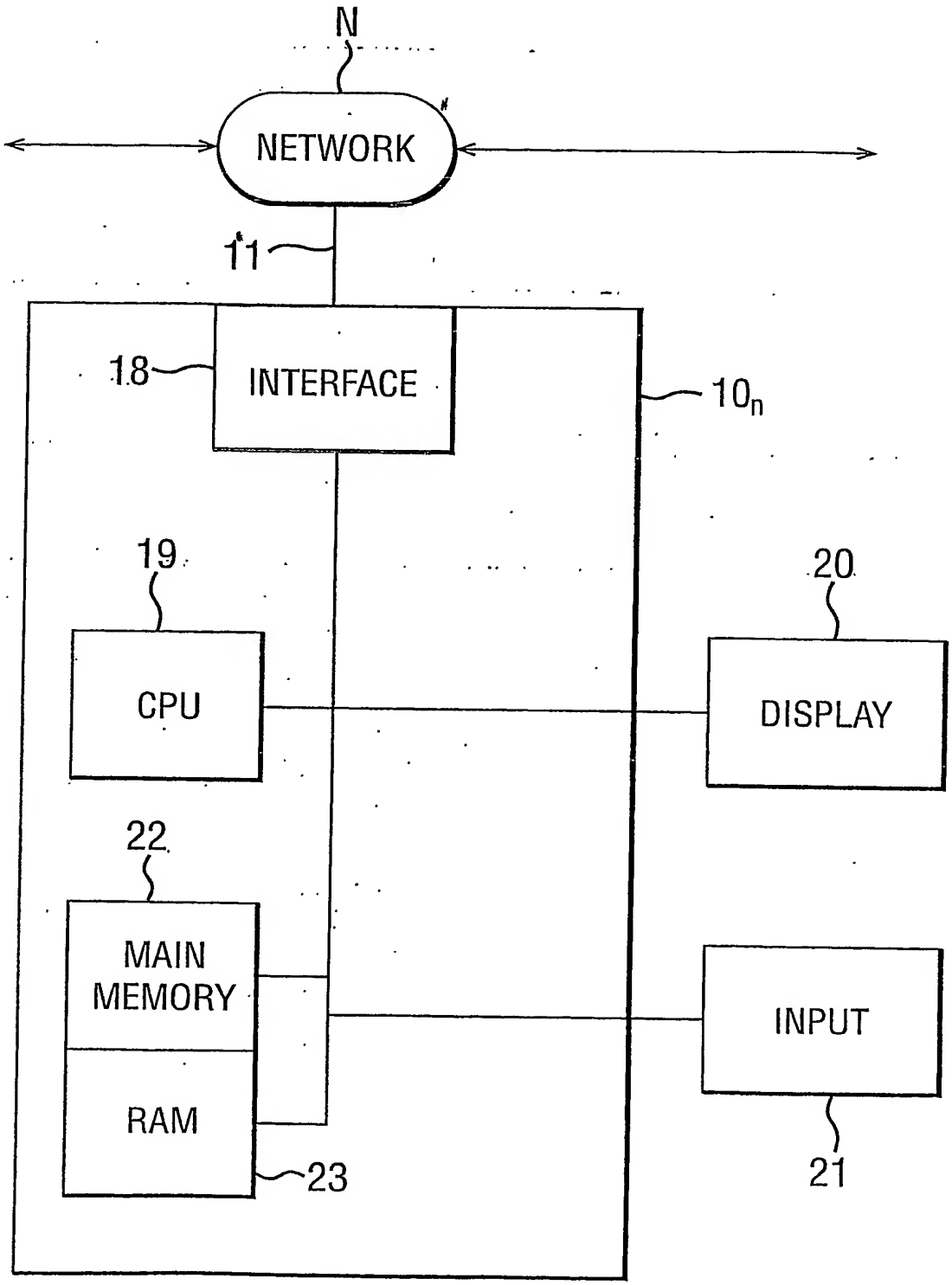
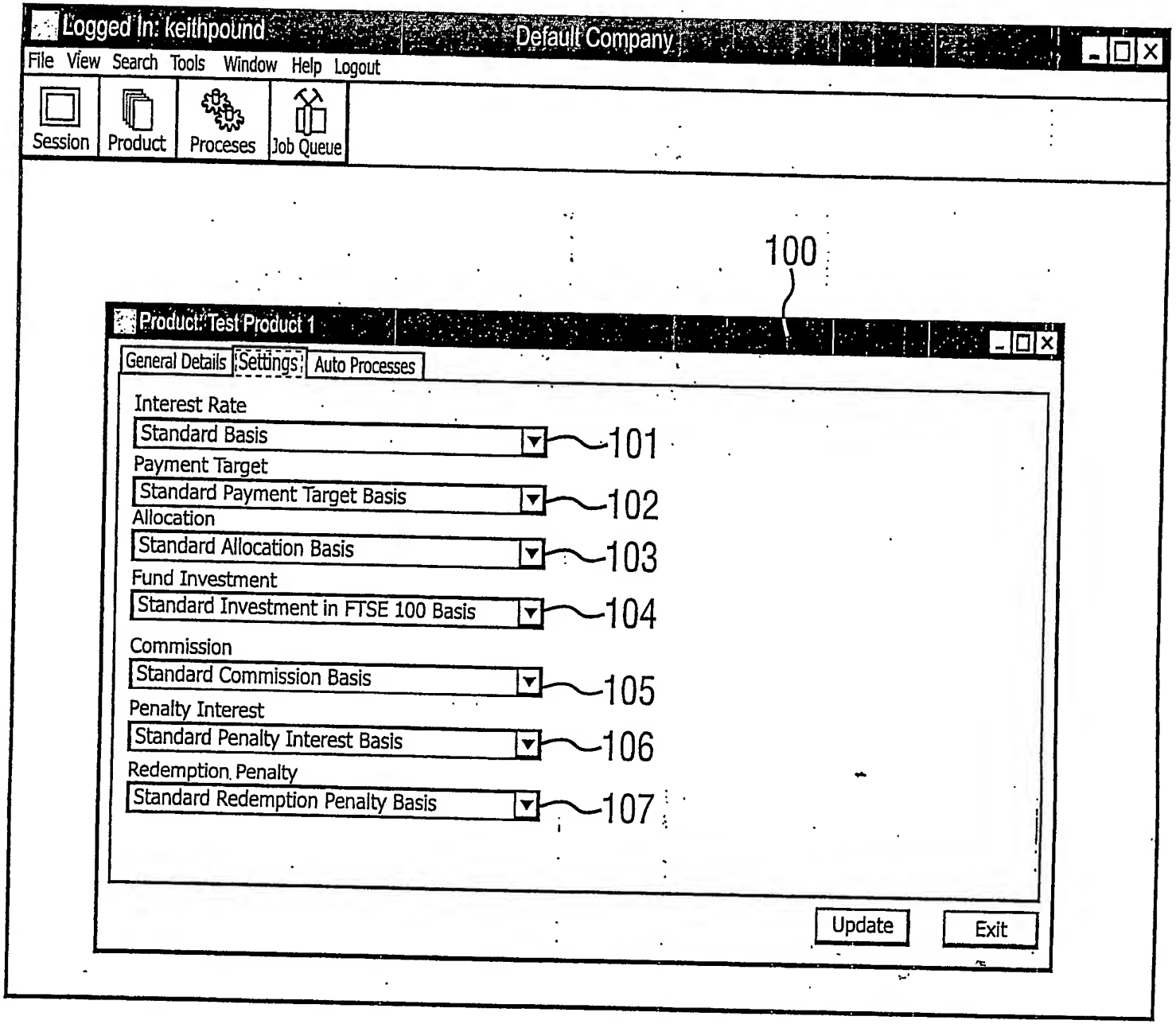

N
NETWORK
11
18
INTERFACE
10n
19
CPU
20
DISPLAY
22
MAIN MEMORY
RAM
23
INPUT
21

FIG. 4A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Default Company
File View Search Tools Window Help Logout
Session
Product
Proceses
Job Queue
100
Product: Test Product 1
General Details
Settings
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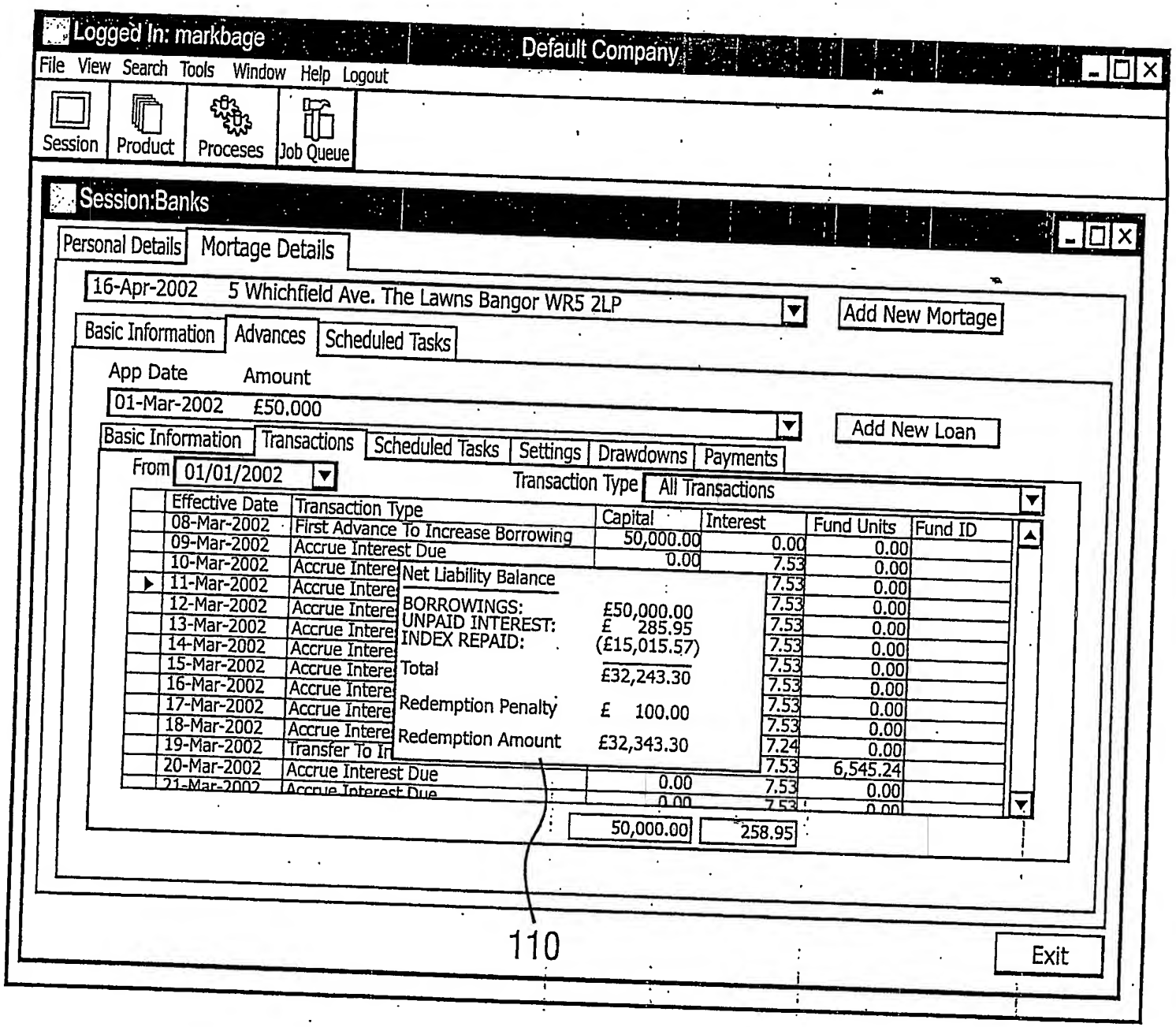
Standard Basis
101
Payment Target
Standard Payment Target Basis
102
Allocation
Standard Allocation Basis
103
Fund Investment
Standard Investment in FTSE 100 Basis
104
Commission
Standard Commission Basis
105
Penalty Interest
Standard Penalty Interest Basis
106
Redemption Penalty
Standard Redemption Penalty Basis
107
Update
Exit

FIG. 4B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Default Company
File View Search Tools Window Help Logout
Session
Product
Proceses
Job Queue
Session:Banks
Personal Details
Mortage Details
16-Apr-2002 5 Whichfield Ave. The Lawns Bangor WR5 2LP
Add New Mortage
Basic Information
Advances
Scheduled Tasks
App Date
Amount
01-Mar-2002 £50,000
Add New Loan
Basic Information
Transactions
Scheduled Tasks
Settings
Drawdowns
Payments
From 01/01/2002
Transaction Type All Transactions
Effective Date
Transaction Type
Capital
Interest
Fund Units
Fund ID
08-Mar-2002 First Advance To Increase Borrowing 50,000.00 0.00 0.00
09-Mar-2002 Accrue Interest Due 0.00 7.53 0.00
10-Mar-2002 Accrue Intere 7.53 0.00
11-Mar-2002 Accrue Intere 7.53 0.00
12-Mar-2002 Accrue Intere 7.53 0.00
13-Mar-2002 Accrue Intere 7.53 0.00
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15-Mar-2002 Accrue Intere 7.53 0.00
16-Mar-2002 Accrue Intere 7.53 0.00
17-Mar-2002 Accrue Intere 7.53 0.00
18-Mar-2002 Accrue Intere 7.53 0.00
19-Mar-2002 Transfer To In 7.24 0.00
20-Mar-2002 Accrue Interest Due 0.00 7.53 6,545.24
21-Mar-2002 Accrue Interest Due 0.00 7.53 0.00
50,000.00 258.95
Net Liability Balance
BORROWINGS: £50,000.00
UNPAID INTEREST: £ 285.95
INDEX REPAID: (£15,015.57)
Total £32,243.30
Redemption Penalty £ 100.00
Redemption Amount £32,343.30
110
Exit

FIGURE 4C'

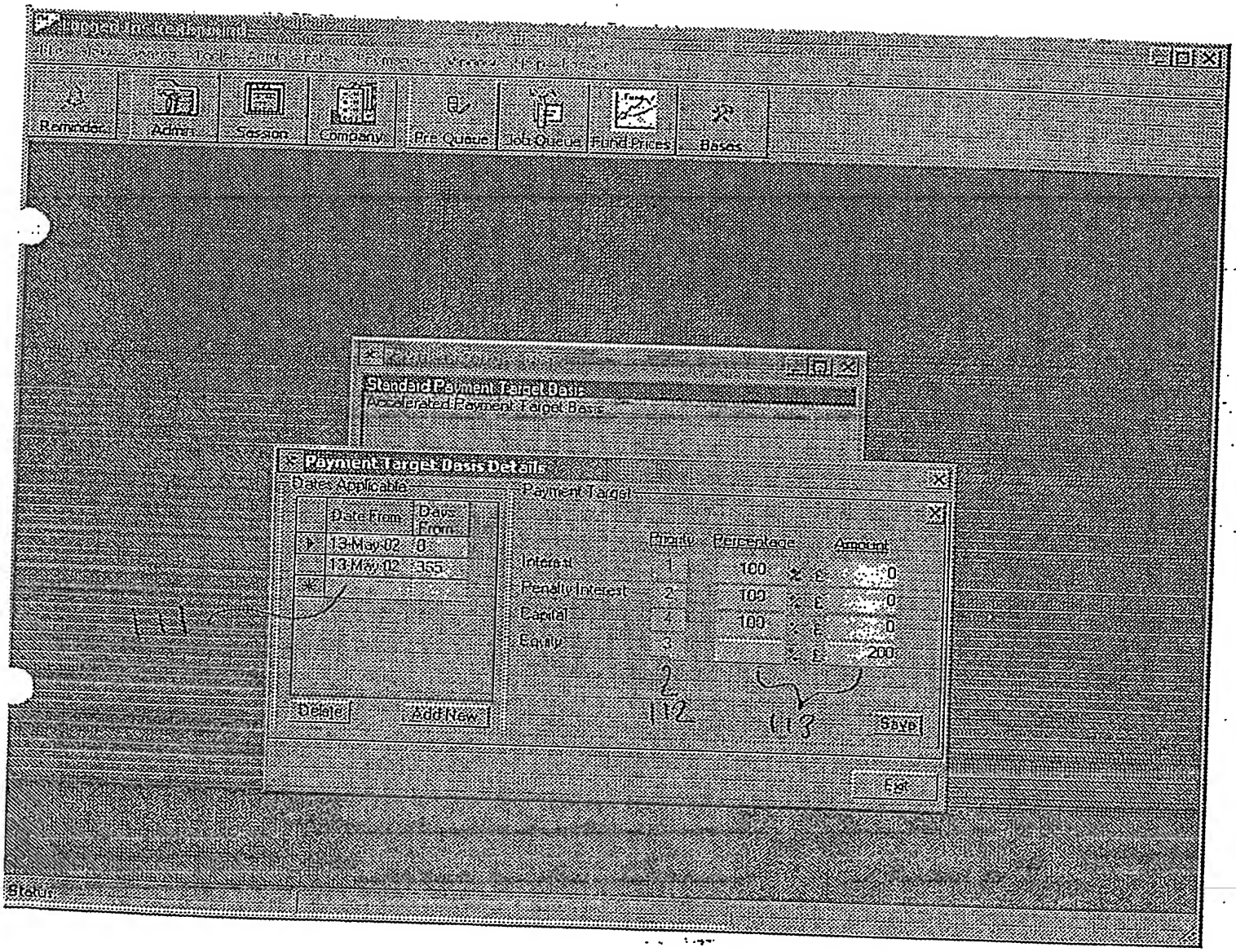
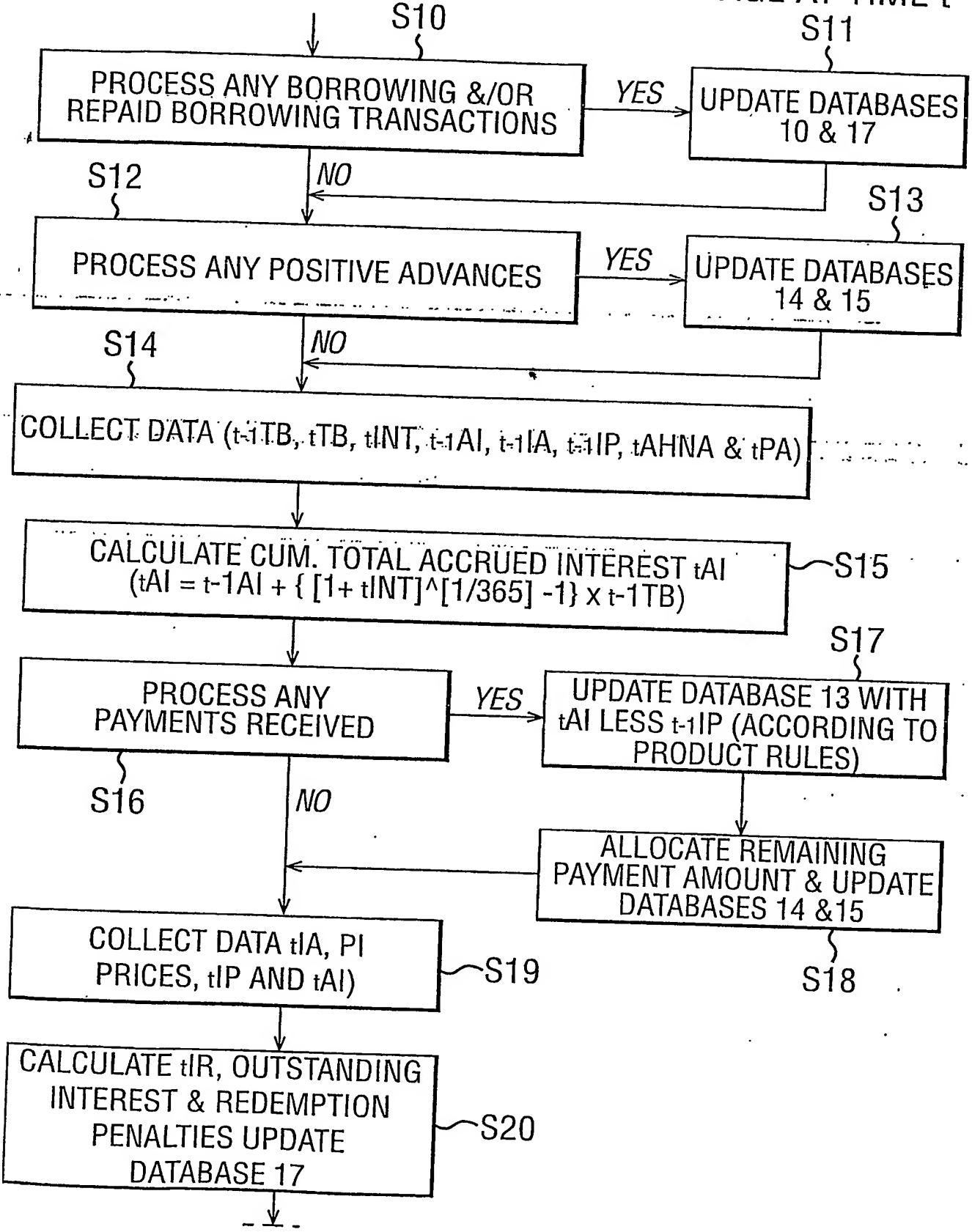

Reminder
Admin
Session
Company
Pre Queue
Job Queue
Fund Prices
Bases
Standard Payment Target Basis
Accelerated Payment Target Basis
Payment Target Basis Details
Dates Applicable
Date From
Days From
13-May-02
0
13-May-02
355
Delete
Add New
Payment Target
Priority
Percentage
Amount
Interest
Penalty Interest
Capital
Equity
100
100
100
200
Save
Exit
Status:
1
2
3
4
5

FIG. 5

MAIN PROCESSING FOR AN INDEX MORTAGE AT TIME t



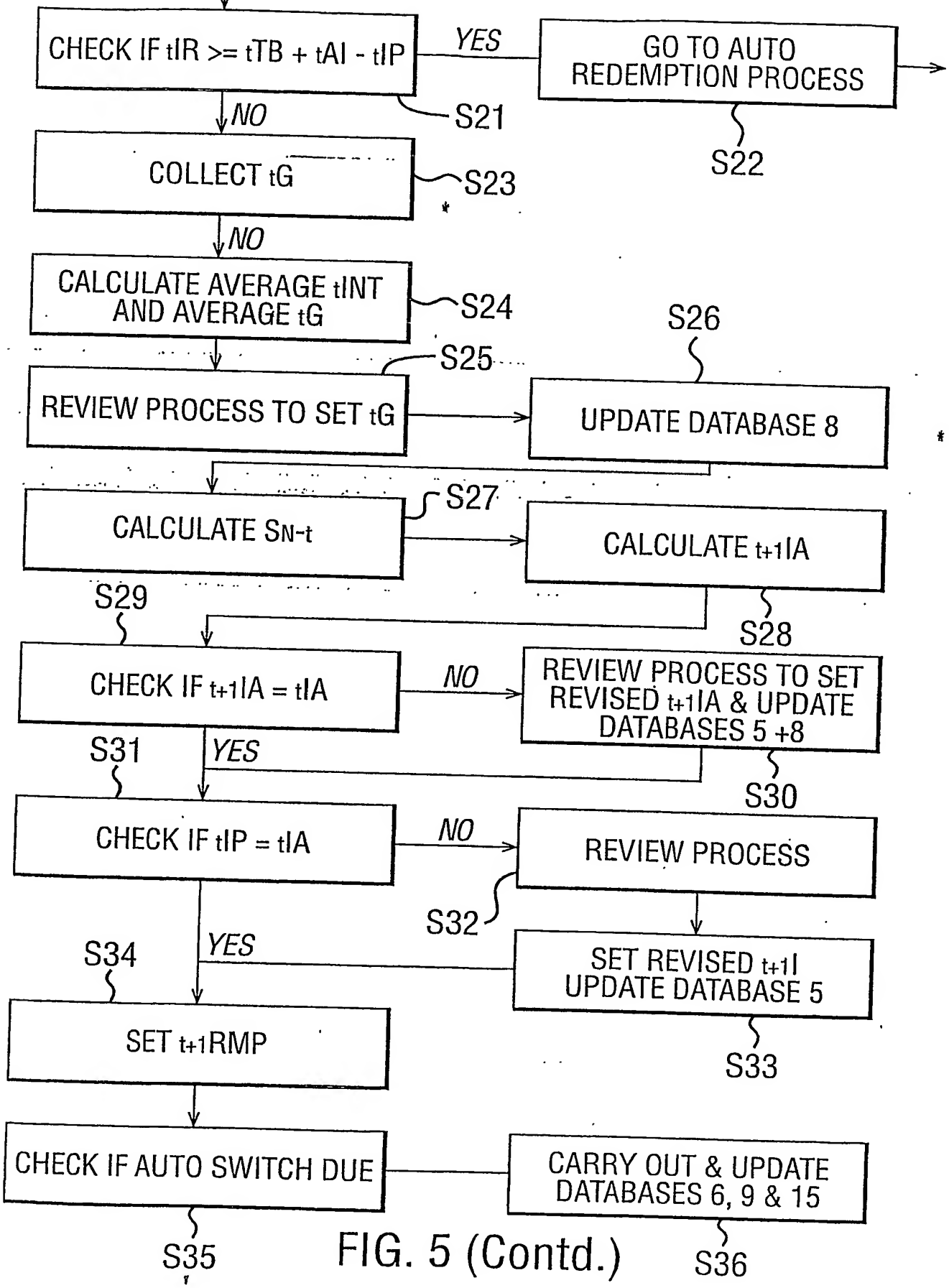

CHECK IF tIR >= tTB + tAI - tIP
YES
GO TO AUTO REDEMPTION PROCESS
S21
S22
NO
COLLECT tG
S23
NO
CALCULATE AVERAGE tINT AND AVERAGE tG
S24
S26
S25
REVIEW PROCESS TO SET tG
UPDATE DATABASE 8
S27
CALCULATE SN-t
CALCULATE t+1IA
S29
S28
CHECK IF t+1IA = tIA
NO
REVIEW PROCESS TO SET REVISED t+1IA & UPDATE DATABASES 5 +8
S31
YES
S30
CHECK IF tIP = tIA
NO
REVIEW PROCESS
S32
S34
YES
SET REVISED t+1I UPDATE DATABASE 5
SET t+1RMP
S33
CHECK IF AUTO SWITCH DUE
CARRY OUT & UPDATE DATABASES 6, 9 & 15
S35
S36

FIG. 5 (Contd.)

FIG. 6

DB5 - PAYMENT ALLOCATION RULES

LOAN REF	START DATE	END DATE	CATEGORIES	PRIORITY	ALLOCATION
xxxx1	$D_1/M_1/Y_1$	$D_2/M_2/Y_2$	INTEREST	1	100% X O/S INTEREST
			CAPITAL	3	100%
			INDEX	2	£20
xxxx2	$D_3/M_3/Y_3$	$D_4/M_4/Y_4$	INTEREST	1	100% X O/S INTEREST
			CAPITAL	2	40%
			INDEX	2	60%
xxxxN	$D_N/M_N/Y_N$	$D_N/M_N/Y_N$	INTEREST	x	R% X O/S INTEREST
		P P P	CAPITAL	y	S%
			INDEX	z	T%
500	501	502	503	504	505

DB6 - PRICE INDEX LINKS

LOAN REF	START DATE	END DATE	TRANSACTION TYPE REF TT1	TRANSACTION TYPE REF TT2	TRANSACTION TYPE REF TT3	TRANSACTION TYPE REF TT4		TRANSACTION TYPE REF TTN
xxxx1	$D_1/M_1/Y_1$	$D_2/M_2/Y_2$	PI1,PI3,PI6	PI2	PI2	PI4		PI2,PI4
xxxx2	$D_3/M_3/Y_3$	$D_4/M_4/Y_4$						
xxxxN								

FIG. 6 (Contd)

DB9

LOAN REF	START DATE	END DATE	CATEGORIES	TRANSACTION TYPE REF TT1	TRANSACTION TYPE REF TT2	TRANSACTION TYPE REF TT3	TRANSACTION TYPE REF TT4		TRANSACTION TYPE REF TTN
xxxx1	$D_1/M_1/Y_1$	$D_2/M_2/Y_2$	ALLOCATION	60%,10%,30%	100%	100%	100%		50%,50%
			GEARING	100%,100%,100%	100%	100%	100%		100%,100%
			MINIMUM	100%,100%,100%	0%	0%	0%		0%,75%
xxxxN	$D_N/M_N/Y_N$	$D_N/M_N/Y_N$							

DB12

DATE	LOAN REF.	AMOUNT
$D_1/M_1/Y_1$	xxxx1	£x1
$D_2/M_2/Y_2$	xxxx2	£x2
$D_N/M_N/Y_N$	xxxxN	£xN

DB13

DATE	LOAN REF.	AMOUNT
$D_1/M_1/Y_1$	xxxx1	£x1
$D_2/M_2/Y_2$	xxxx2	£x2
$D_N/M_N/Y_N$	xxxxN	£xN

FIG. 6 (Contd)

DB14

DATE	LOAN REF.	AMOUNT	TRANSCTION TYPE
$D_1/M_1/Y_1$	xxxx1	£xxx1	TTA
$D_2/M_2/Y_2$	xxxx2	£xxx2	TTB
⋮	⋮	⋮	⋮
$D_N/M_N/Y_N$	xxxxN	£xxxN	TTN

DB15

DATE	LOAN REF.	PRICE INDEX	UNITS	TRANSCTION TYPE
$D_1/M_1/Y_1$	xxxx1	yyy1	z1	TTA
$D_2/M_2/Y_2$	xxxx2	yyy2	z2	TTB
⋮	⋮	⋮	⋮	⋮
$D_N/M_N/Y_N$	xxxxN	yyyN	zN	TTN

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